CHAPTER 8

STYLIZED EARNINGS FOR BIRTH COHORTS 1931-60

I. INTRODUCTION

This chapter presents stylized earnings profiles for workers in birth cohorts 1931-60. It displays the patterns of Social Security qualifying earnings between three periods of a worker's career -- ages 31-40, 41-50, and 51-60. It divides workers into groups based on the level and shape of their career earnings patterns and then displays the earnings patterns for the average or typical workers in each group. Separate earnings patterns are shown for male and female workers.

The next section of the chapter discusses the methodology used. The following section displays some preliminary earnings patterns for workers in the 1931-40 birth cohort who have completed their working careers. This was the basis for much of the initial exploration of the characteristics of the earnings patterns. The last section creates patterns for all the 1931-60 birth cohorts, based on the projections of earnings reported in Chapter 2.

II. BASIC METHODOLOGY

Individuals' earnings are expressed as relatives by dividing each year's earnings by the economy-wide average wage of that year. Because the reported earnings are truncated by the taxable wage ceiling of each year, we adjusted earnings of those at the ceiling to put them on a basis that is consistent with the current relationship of the taxable ceiling to the average wage.[1] The wage data are then lined up by age, and we developed a classification system based on the pattern of individuals' earnings from age 32 through age 61.[2] We excluded earnings for ages below 32 because nearly all workers had rising earnings over this period and some individuals have very low earnings because they are still in school. We computed the average of the earnings relatives in each of the three 10-year sub-periods extending from age 32 through age 61, labeled as A, B, and C.

Workers are classified in terms of three characteristics: (1) their "lifetime wage" computed as the average of their wage relatives over the 30-year period (low, middle, and high), (2) the trend change in the relative wage between sub-periods A and C (falling, level, rising), and (3) a profile based on whether the average wage during period B differs from the average of A and C (sag, level, humped):

Trend

$t = (C-A) / (C+A)$

Declining	$t < -1/9$
Level	$-1/9 < t > 1/9$
Increasing	$t > 1/9$

Profile

$p = (B -(A+C)/2) / (B + (A+C)/2)$

Sag	$p < -1/9$
linear	$-1/9 < p > 1/9$
humped	$p > 1/9$

The three categories of the 30-year average wage were computed as equal thirds of the distribution of "lifetime" wages for all the birth cohorts between 1931 and 1960. The middle class interval was from 0.37 to 1.04 of the average wage.[3] The cutoffs for the trend and profile characteristics were chosen to be symmetric and yield roughly a third of the observations in each of the three categories. The result is a three-way table with a total of 27 entries.

The analysis includes all individuals who are predicted to survive to age 62, and the actual earnings records extend through 1996. Thus, the earnings profile is based on actual data for those born in 1931-35, but the projected earnings from Chapter 2 become progressively more important for later cohorts.

III. STYLIZED EARNINGS - 1931-40 BIRTH COHORT

The exploration of the historical data was based on the earnings records of those individuals born in the interval of 1931-40 and included in the 1991-93 SIPPs. The initial analysis indicated a surprisingly high degree of diversity in the earnings patterns. The 27 patterns are displayed in Figure 8-1 and the distribution of individuals is reported in Table 8-1. Roughly equal numbers of workers have declining as have rising relative earnings over their primary working years. Similarly, nearly as many workers have a slump of earnings in their middle work years as have the prototypical hump. While men and women differ substantially in the levels of their lifetime earnings, they exhibit equally wide variations in the shape of the earnings profiles.

In an effort to account for the diversity, we related the distribution of individuals among the earning profiles to other attributes, such as gender, race and education. The results of that exercise are summarized in Table 8-2. The largest difference in the level of average work life earnings can be traced to gender, as only 14 percent of the men are in the lowest third of the distribution compared to 53 percent for women. On the other hand, women are more likely to

Figure 8-1
Age Profiles of Earnings, 1931-40 Birth Cohorts, 27 Groups

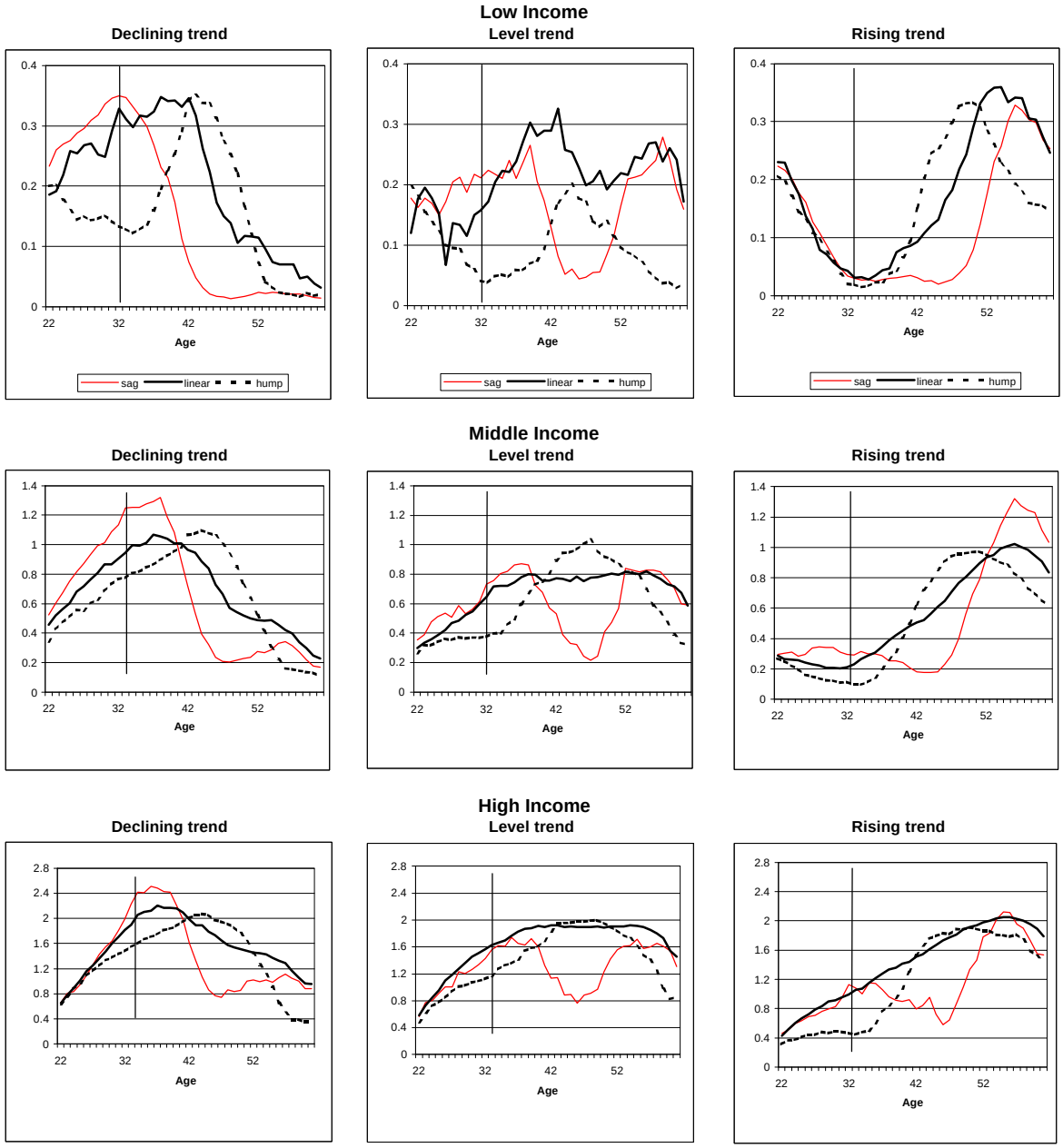


Table 8-1
Distribution of Individuals by Age Profile of Earnings, 27 Groups

Percentage distribution.
Individuals born in 1931-40, includes years of zero earnings

		All Persons				Males				Females			
		Profile				Profile				Profile			
Low Earnings		sag	linear	humped		sag	linear	humped		sag	linear	humped	
	declining	10.4	2.0	5.4	17.8	6.9	1.2	2.1	10.2	13.7	2.7	8.6	25.0
Trend	level	0.6	0.2	1.7	2.6	0.2	0.0	0.2	0.5	1.0	0.4	3.2	4.6
	rising	7.3	1.8	5.1	14.3	2.6	0.3	1.0	3.8	11.8	3.3	8.9	24.1
		18.3	4.0	12.2	34.6	9.6	1.6	3.3	14.5	26.6	6.4	20.7	53.6
Middle Earnings		sag	linear	humped		sag	linear	humped		sag	linear	humped	
	declining	3.8	4.5	5.5	13.8	6.1	6.3	6.4	18.8	1.6	2.8	4.6	9.0
Trend	level	0.6	2.2	1.6	4.5	0.7	1.8	1.0	3.4	0.6	2.7	2.2	5.4
	rising	2.2	4.7	6.4	13.3	1.2	1.0	2.0	4.2	3.1	8.2	10.5	21.8
		6.6	11.4	13.5	31.5	8.0	9.1	9.4	26.4	5.3	13.6	17.3	36.2
High Earnings		sag	linear	humped		sag	linear	humped		sag	linear	humped	
	declining	1.2	5.1	6.5	12.8	2.5	10.2	12.1	24.9	0.0	0.2	1.2	1.4
Trend	level	0.4	10.2	2.3	13.0	0.8	19.3	4.0	24.1	0.1	1.7	0.8	2.5
	rising	0.4	5.4	2.3	8.1	0.6	7.1	2.4	10.1	0.2	3.8	2.2	6.2
		2.1	20.7	11.1	33.9	3.9	36.6	18.5	59.1	0.3	5.7	4.2	10.2
					100.0				100.0				

Table 8-2
Distribution of Individuals by Characteristics and Earnings Profile, 1931-40 Birth Cohort

Percent of cohort population

	Non-disabled									
						Highest Degree Attained				
	Total	Male	Female	Black	Hispanic	No degree	High School Diploma	College Degree	Qualified	Disabled
						Income Level				
Low	34.4	13.7	52.9	38.9	44.3	46.5	34.0	25.4	24.1	35.8
Middle	29.9	22.8	36.2	40.4	32.4	31.1	32.8	21.1	34.6	42.0
High	35.6	63.4	10.9	20.7	23.3	22.4	33.3	53.5	41.3	22.2
						Trend				
Declining	40.0	48.0	32.8	45.1	40.6	50.4	38.6	34.6	37.9	74.1
Level	21.4	31.3	12.6	18.9	18.4	19.9	21.4	22.9	23.3	10.6
Rising	38.6	20.7	54.6	36.1	41.1	29.6	40.0	42.5	38.8	15.3
						Profile				
Slumped	27.3	21.1	32.7	32.1	30.1	32.2	26.9	23.8	21.1	25.4
Linear	38.2	50.8	27.0	34.8	29.7	32.2	37.8	44.6	43.6	22.4
Humped	34.6	28.1	40.3	33.1	40.2	35.6	35.3	31.5	35.3	52.2

have a rising pattern of earnings over their work life, while the most common pattern for men is one of decline. For the profile characteristic, women are somewhat more likely to be at the extremes with a significant hump or slump to their earnings in their middle working years. Black and Hispanic workers are also scarce in the upper portions of the wage distribution, and black workers are somewhat more likely to have declining relative earnings over the work life. In addition, workers with low levels of education are far more likely to be in the bottom of the distribution of earnings and to experience a decline in their relative earnings over their work life. Finally, as illustrated in columns (9) and (10), the distribution of individuals by level and trend of earnings is very strongly impacted by the exclusion of those who do not have the 40 quarters of coverage required to qualify for a pension and the disabled.

1. Boundaries

As shown above in Section II, the separation of earnings patterns by trend (t) and profile (p) was based on a common cutoff value of 1/9th above and below zero for both t and p where A, B, and C are the average earnings in consecutive 10-year subperiods from age 32 to 61. We have tested for the sensitivity to variations in the boundaries. While a widening of the band about zero increases the proportion of the sample that falls in the midgroup, there is little effect on the general shape of the earnings profiles. For example, a widening of the boundary from 1/9th to 1/6th increases the proportion of the sample in the middle categories by one-third, but it has little discernable effect on the shape of the earnings profile. We conclude that the choice of the boundary does not have a major effect on our conclusions about the diversity of earnings patterns, but that we also have little basis for choosing a specific value. The 1/9th was chosen to yield roughly equal numbers of individuals in each of the three categories of the trend and profile.

2. Non-zero Earnings

The original set of earnings patterns were computed by including the earnings of all individuals in the category regardless of whether they had earnings in a given year. We also computed a second earnings profile for each group that excluded individuals with earnings of less than 0.01 of the average in each specific year. In addition, we can show the proportion of individuals in the category that had zero earnings in a given year.

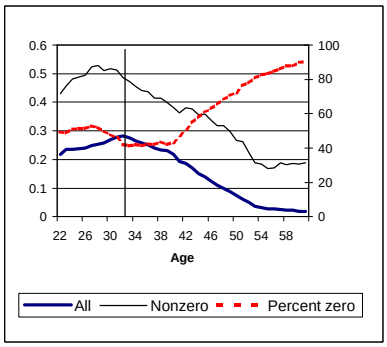
These results are illustrated in Figures 8-2a through 8-2c. In order to reduce the number of comparisons to a manageable level, the profile dimension is suppressed, and the figures are presented for 9 categories that separate individuals by the level and trend of the income profile. The profiles are also shown separately for men and women. The exclusion of nonearners in each year will obviously result in a higher earnings profile where the magnitude of difference is related to the proportion of individuals with zero earnings. But the two earnings profiles remain remarkably similar in appearance. A surprisingly small proportion of the variation in the earnings profile is related to changes in the proportion of individuals with zero earnings.

Figure 8-2a
Earnings Profiles With and Without Zero Earnings Years, All Persons

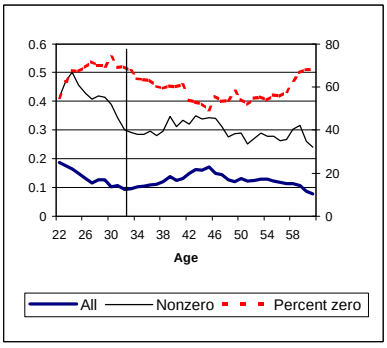
1931-40 Cohort

Low Income

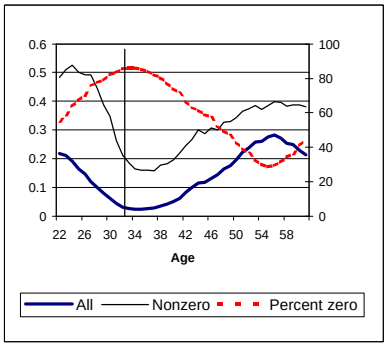
Declining Trend



Level Trend

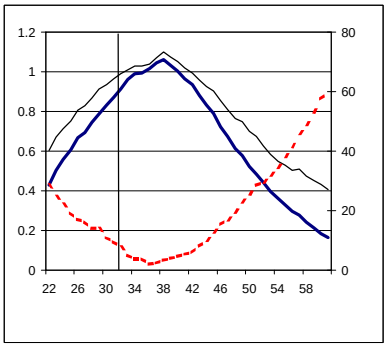


Rising Trend

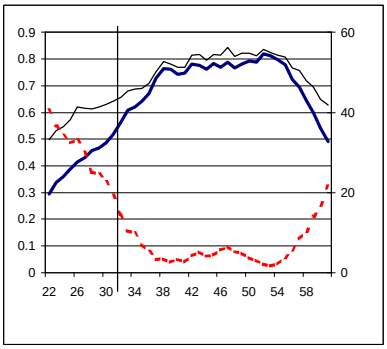


Middle Income

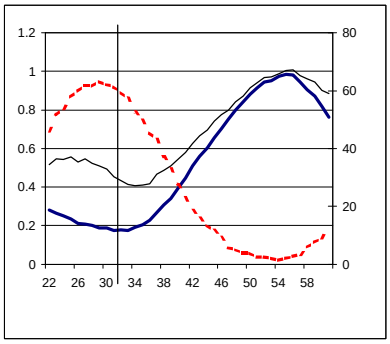
Declining Trend



Level Trend

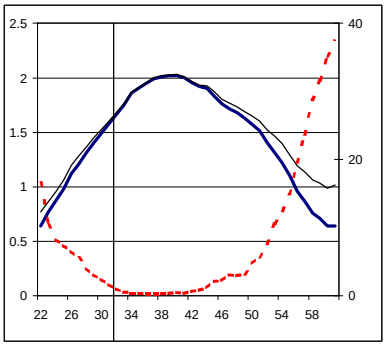


Rising Trend

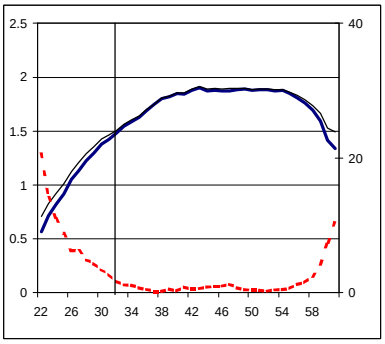


High Income

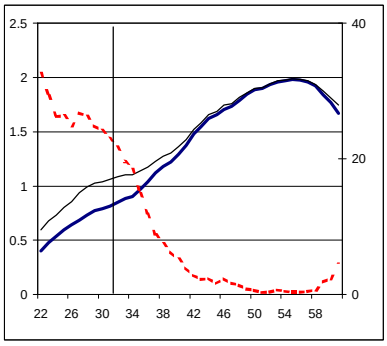
Declining Trend



Level Trend



Rising Trend



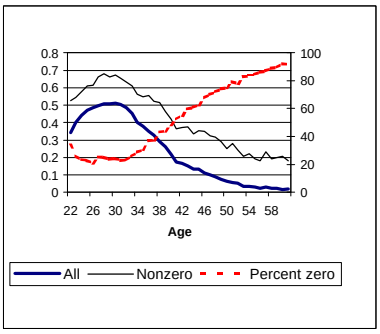
Average earnings are measured on the left scale.
The percent of the category with zero earnings in each year is measured on the right scale.

Figure 8-2b
Earnings Profiles With and Without Zero Earnings Years, Men

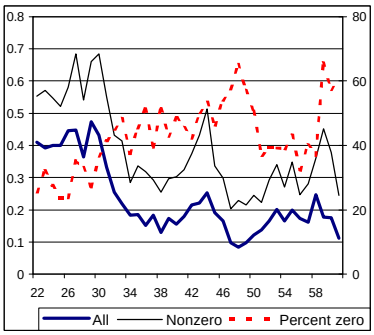
1931-40 Cohort

Low Income

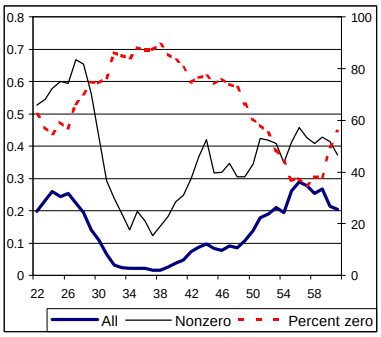
Declining Trend



Level Trend



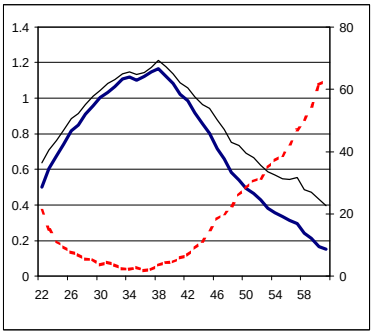
Rising Trend



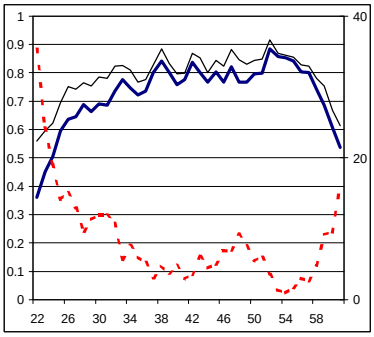
0

Middle Income

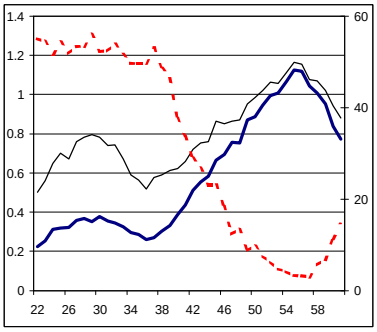
Declining Trend



Level Trend

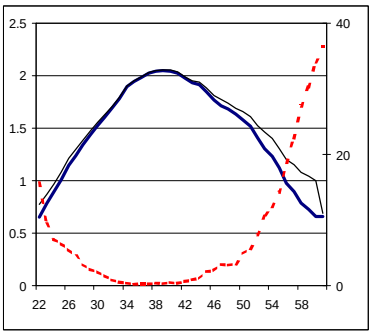


Rising Trend



High Income

Declining Trend



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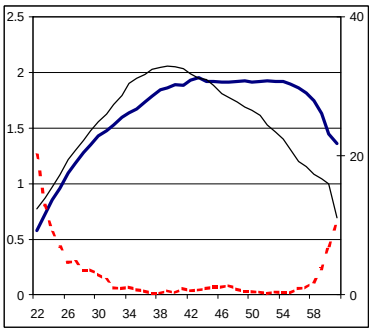

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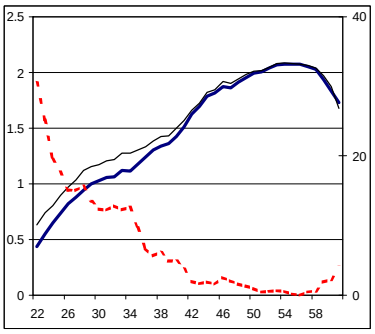
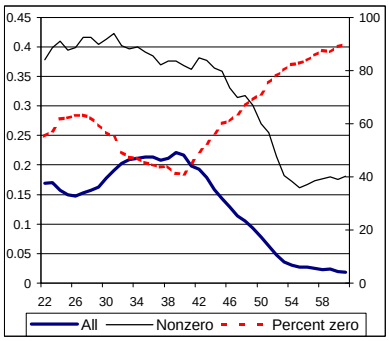


Figure 8-2c
Earnings Profiles With and Without Zero Earnings Years, Women

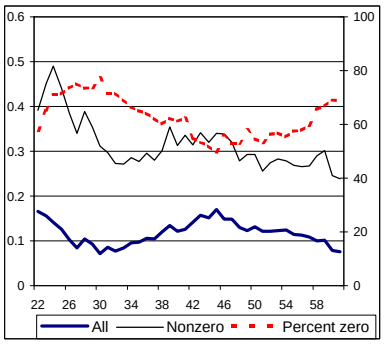
1931-40 Cohort

Low Income

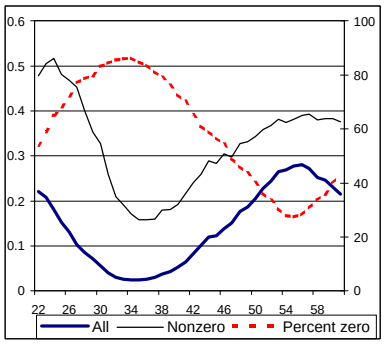
Declining Trend



Level Trend

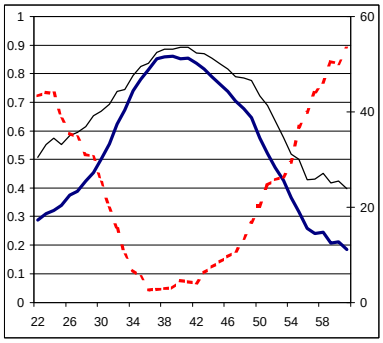


Rising Trend

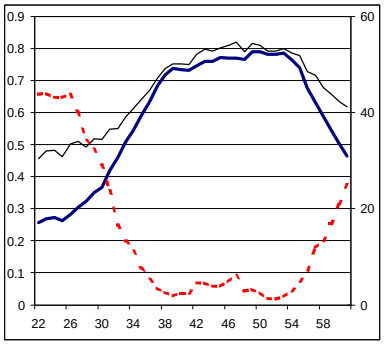


Middle Income

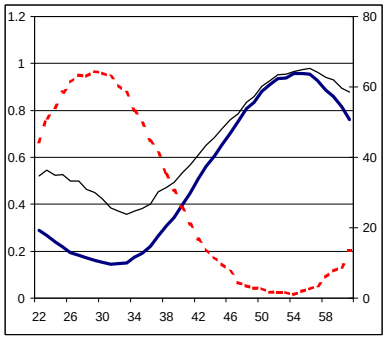
Declining Trend



Level Trend

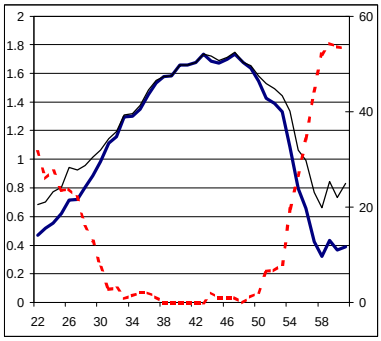


Rising Trend

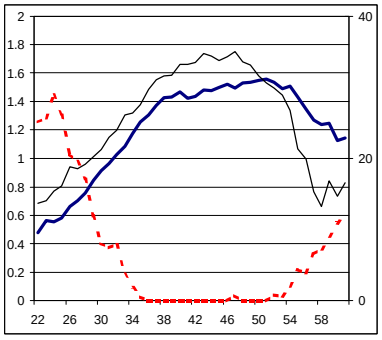


High Income

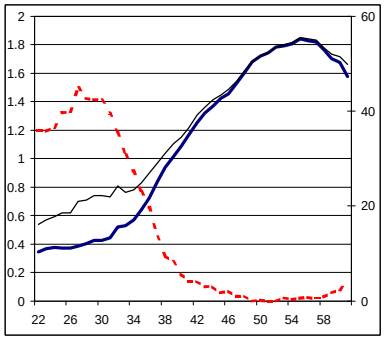
Declining Trend



Level Trend



Rising Trend



There is a very large difference in the frequency of zero earnings years, however, between the low and high-income categories. For the low-income groups, the proportion with zero earnings in a specific year ranged as high as 80 percent and averages near 60 percent, while the high-income earners are distinguished by the stability of their employment rates, with average nonparticipation rates of less than 10 percent. Furthermore, women are twice as likely as men to have years of zero earnings between ages 32 and 61, but the rates of non-participation are very comparable within earnings groups. Because years of zero earnings are more common at the beginning and end of the work life, they have a significant, but not a dominant, impact on the trend in earnings.

Since we only have annual information on earnings, it is possible that earnings are depressed in the year prior to and in the year after a zero-earnings year. Thus, we also experimented with a tabulation that excluded those years as well; but the general shape of each profile was largely unaffected.

Finally, we calculated standard deviations for the annual average of the relative wage in each pattern. Those standard deviations ranged from 0.2 - 0.3 of the economy-wide average wage in the three low-wage groups to 0.5 - 0.7 for the three high-wage patterns. Thus, this measure of variation rises with income, but much less than proportionately. There is also no particular tendency for the standard errors to rise or fall with increases in age, nor are there significant differences by sex.

IV. STYLIZED EARNINGS, 1931-60 BIRTH COHORTS, USING PROJECTED EARNINGS

We applied the methodology described above for earning patterns for the 1931-40 birth cohorts to later cohorts by using the earnings projections presented in Chapter 2 for the years after 1996. The methodology used to classify individuals into specific pattern groups is identical to that used for the 1931-40 cohorts in Section III of this chapter, but some characteristics of the projected individual earnings after 1996 suggests that the basic results should be aggregated to about 9 categories.

1. Classification Into 27 Earnings Patterns

We have calculated the distributions of workers among the 27 categories described above together with the average earnings pattern within each group for ages 22 to 61, the age pattern of non-zero earnings, and the percent of individuals in each group with zero earnings in each year.[4] The distribution of individuals among the earnings patterns, for all individuals and for men and women separately, are summarized in Tables 8-3a through 8-3c and Tables 8-4a through 8-4c.

Table 8-3a
Distribution of Individuals by 27 Earnings Patterns

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	10.8	10.0	10.7	9.7	5.0	3.7
Q1T1P2	2.0	2.0	2.3	2.2	2.9	3.2
Q1T1P3	5.6	5.3	3.7	3.4	6.1	8.4
Q1T2P1	0.8	0.5	0.3	0.4	0.5	0.3
Q1T2P2	0.2	0.2	0.6	0.6	1.4	1.9
Q1T2P3	1.8	1.7	1.4	2.2	3.8	3.5
Q1T3P1	8.2	6.6	3.8	1.5	0.4	0.3
Q1T3P2	1.8	1.9	1.7	1.7	1.5	1.4
Q1T3P3	5.3	4.8	8.3	9.5	10.2	9.2
Q2T1P1	3.1	4.5	4.0	4.3	1.6	1.0
Q2T1P2	3.8	5.1	6.0	6.0	8.0	9.5
Q2T1P3	5.5	5.5	4.3	4.3	6.8	7.6
Q2T2P1	0.7	0.6	0.3	0.4	0.6	0.4
Q2T2P2	2.1	2.3	3.8	4.9	8.9	11.3
Q2T2P3	1.7	1.5	1.5	2.3	2.4	2.2
Q2T3P1	2.4	2.0	0.3	0.1	0.3	0.3
Q2T3P2	4.9	4.6	2.8	1.6	1.9	2.1
Q2T3P3	6.2	6.6	9.3	8.2	2.8	1.2
Q3T1P1	1.1	1.3	1.0	1.2	0.3	0.1
Q3T1P2	4.2	5.8	6.9	6.2	7.3	8.9
Q3T1P3	7.1	5.9	2.1	1.8	2.2	2.0
Q3T2P1	0.4	0.5	0.1	0.2	0.3	0.2
Q3T2P2	9.2	11.2	15.6	18.4	21.8	20.1
Q3T2P3	3.0	1.7	1.7	2.2	1.5	0.5
Q3T3P1	0.4	0.4	0.0	0.0	0.0	0.0
Q3T3P2	5.7	5.2	3.4	2.4	1.0	0.4
Q3T3P3	2.1	2.5	4.0	4.3	0.7	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-3b
Distribution of Individuals by 27 Earnings Patterns, Men

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	7.0	6.7	8.4	8.4	6.0	5.6
Q1T1P2	1.3	1.2	1.5	1.5	3.4	4.3
Q1T1P3	2.0	2.1	2.2	3.3	6.7	9.2
Q1T2P1	0.3	0.1	0.1	0.0	0.1	0.2
Q1T2P2	0.0	0.0	0.1	0.0	0.1	0.2
Q1T2P3	0.2	0.2	0.9	1.6	2.1	0.7
Q1T3P1	3.0	2.1	1.2	0.2	0.0	0.1
Q1T3P2	0.1	0.5	0.3	0.1	0.1	0.2
Q1T3P3	1.0	1.0	2.1	1.7	0.6	0.7
Q2T1P1	4.8	7.4	5.6	5.4	2.2	1.6
Q2T1P2	5.5	7.0	8.8	9.8	15.0	17.8
Q2T1P3	6.6	6.2	5.2	6.1	10.3	11.1
Q2T2P1	0.7	0.6	0.1	0.2	0.3	0.2
Q2T2P2	1.9	1.6	1.5	1.0	1.6	1.9
Q2T2P3	1.1	0.9	1.8	3.0	1.7	1.1
Q2T3P1	1.0	1.4	0.1	0.0	0.0	0.0
Q2T3P2	1.0	1.0	0.7	0.3	0.2	0.3
Q2T3P3	2.1	1.8	3.2	3.0	0.4	0.4
Q3T1P1	2.3	2.7	1.9	2.0	0.5	0.2
Q3T1P2	8.6	11.7	13.9	12.6	15.2	18.6
Q3T1P3	13.6	10.8	4.0	3.2	3.8	3.3
Q3T2P1	0.7	0.9	0.2	0.2	0.2	0.2
Q3T2P2	17.7	20.8	27.2	27.4	26.9	21.3
Q3T2P3	5.3	2.8	3.0	4.2	2.0	0.6
Q3T3P1	0.6	0.6	0.0	0.0	0.0	0.0
Q3T3P2	8.8	5.6	2.5	0.7	0.1	0.1
Q3T3P3	2.6	2.2	3.7	4.1	0.5	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-3c
Distribution of Individuals by 27 Earnings Patterns, Women

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	14.3	13.1	12.7	10.8	4.0	2.1
Q1T1P2	2.6	2.8	3.1	2.8	2.5	2.3
Q1T1P3	8.9	8.2	5.1	3.5	5.5	7.7
Q1T2P1	1.3	0.8	0.6	0.8	0.8	0.4
Q1T2P2	0.4	0.4	1.0	1.1	2.6	3.3
Q1T2P3	3.3	3.0	1.9	2.7	5.2	5.8
Q1T3P1	13.0	10.7	6.1	2.6	0.7	0.6
Q1T3P2	3.4	3.2	2.9	3.1	2.7	2.3
Q1T3P3	9.5	8.4	13.7	16.3	18.5	16.6
Q2T1P1	1.4	1.9	2.5	3.3	1.0	0.5
Q2T1P2	2.3	3.2	3.6	2.6	1.9	2.3
Q2T1P3	4.5	4.8	3.4	2.8	3.9	4.6
Q2T2P1	0.6	0.6	0.6	0.6	0.9	0.6
Q2T2P2	2.4	3.0	5.8	8.3	15.1	19.4
Q2T2P3	2.3	2.0	1.2	1.7	3.1	3.1
Q2T3P1	3.6	2.6	0.5	0.1	0.5	0.6
Q2T3P2	8.5	7.9	4.6	2.8	3.4	3.7
Q2T3P3	10.0	11.1	14.8	12.7	4.8	2.0
Q3T1P1	0.0	0.0	0.2	0.5	0.1	0.1
Q3T1P2	0.1	0.3	0.8	0.6	0.4	0.6
Q3T1P3	1.1	1.3	0.5	0.6	0.9	0.8
Q3T2P1	0.0	0.2	0.0	0.2	0.4	0.2
Q3T2P2	1.1	2.2	5.3	10.6	17.3	19.1
Q3T2P3	0.8	0.7	0.6	0.4	1.0	0.4
Q3T3P1	0.1	0.2	0.0	0.1	0.0	0.1
Q3T3P2	2.7	4.8	4.1	3.8	1.8	0.6
Q3T3P3	1.7	2.7	4.2	4.5	0.8	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level
Low = 1
Average = 2
High = 3

T = Income Tend
Declining = 1
Level = 2
Rising = 3

P = Profile
P = 1 slumped
P = 2 linear
P = 3 humped

Table 8-4a
Summary Distributions by Earnings Patterns, All Persons

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	18.3	17.3	16.7	15.4	14.0	15.3
Q1T2	2.8	2.3	2.3	3.3	5.7	5.7
Q1T3	15.3	13.2	13.8	12.7	12.0	10.9
Q2T1	12.4	15.1	14.3	14.6	16.4	18.2
Q2T2	4.5	4.4	5.6	7.6	11.9	13.9
Q2T3	13.4	13.1	12.5	9.9	5.0	3.7
Q3T1	12.5	13.1	10.1	9.2	9.8	11.0
Q3T2	12.5	13.4	17.4	20.8	23.5	20.8
Q3T3	8.2	8.0	7.3	6.7	1.6	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	36.5	32.9	32.8	31.3	31.7	31.9
Q2	30.3	32.6	32.3	32.1	33.3	35.8
Q3	33.2	34.5	34.8	36.7	35.0	32.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	43.2	45.4	41.1	39.1	40.2	44.5
T2	19.9	20.1	25.4	31.6	41.2	40.4
T3	36.9	34.4	33.6	29.2	18.6	15.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	27.6	26.4	20.6	17.7	8.9	6.5
P2	33.9	38.2	43.0	44.0	54.7	58.8
P3	38.4	35.3	36.4	38.3	36.4	34.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-4b
Summary Distributions by Earnings Patterns, Men

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	10.3	10.0	12.0	13.3	16.1	19.1
Q1T2	0.6	0.3	1.0	1.7	2.3	1.1
Q1T3	4.1	3.6	3.6	1.9	0.6	1.0
Q2T1	16.9	20.6	19.6	21.3	27.6	30.6
Q2T2	3.7	3.2	3.5	4.2	3.6	3.2
Q2T3	4.2	4.2	4.0	3.4	0.6	0.7
Q3T1	24.5	25.2	19.8	17.7	19.5	22.0
Q3T2	23.7	24.5	30.4	31.8	29.1	22.0
Q3T3	12.0	8.3	6.1	4.7	0.6	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	15.0	14.0	16.7	16.9	19.1	21.3
Q2	24.8	28.0	27.0	28.9	31.8	34.5
Q3	60.2	58.0	56.3	54.3	49.1	44.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	51.7	55.9	51.4	52.3	63.2	71.7
T2	27.9	28.0	34.9	37.7	35.1	26.4
T3	20.3	16.1	13.7	10.0	1.8	1.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	20.5	22.6	17.5	16.4	9.4	8.1
P2	45.0	49.4	56.3	53.4	62.6	64.7
P3	34.5	28.0	26.2	30.2	28.0	27.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-4c
Summary Distributions by Earnings Patterns, Women

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	25.9	24.1	20.8	17.2	12.1	12.1
Q1T2	5.0	4.2	3.5	4.6	8.6	9.6
Q1T3	26.0	22.3	22.8	22.0	21.8	19.5
Q2T1	8.1	9.9	9.6	8.7	6.7	7.4
Q2T2	5.3	5.5	7.5	10.6	19.1	23.1
Q2T3	22.1	21.5	19.9	15.6	8.8	6.3
Q3T1	1.2	1.7	1.5	1.7	1.5	1.5
Q3T2	1.9	3.1	6.0	11.1	18.7	19.7
Q3T3	4.5	7.8	8.4	8.4	2.6	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	56.8	50.6	47.1	43.8	42.6	41.2
Q2	35.6	36.9	37.0	34.9	34.6	36.8
Q3	7.6	12.5	15.9	21.3	22.8	22.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	35.2	35.6	32.0	27.6	20.3	20.9
T2	12.2	12.8	16.9	26.4	46.4	52.4
T3	52.6	51.6	51.1	46.0	33.2	26.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	34.4	30.0	23.3	18.9	8.5	5.1
P2	23.5	27.7	31.3	35.8	47.8	53.7
P3	42.1	42.2	45.4	45.3	43.7	41.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

As is evident in Tables 8-3a through 8-3c, the number of individuals in some categories is too small to provide useful estimates. Tables 8-4a through 8-4c aggregate the earnings patterns across each of the three characteristics that define an earnings pattern (average earnings, trend and profile) for all individuals, men, and women. The distributions by average earnings remain relatively stable across the six birth cohorts, but there are significant changes in the distributions by trend and profile. In particular, it is evident from the distributions by profile at the bottom of Tables 8-4a through 8-4c that the methodology of projecting earnings in Chapter 2 is not able to predict individuals with a sag in earnings during the middle work years. The proportion of all individuals with a sag pattern (Table 8-4a) falls from 27.6 percent for the 1931-35 birth cohort, where all of the earnings are actual values, to 6.5 percent in the 1956-60 cohort, where earnings are projected after age 40. At the same time the proportion of men with a level earnings pattern (Table 8-4b) rises to over 60 percent in the 1956-60 birth cohort. There is also a substantial decline in the proportion of men and women with rising earnings patterns as the analysis shifts toward cohorts with a large proportion of projected earnings. We will return to that issue below.

After consultation with SSA personnel, we have concentrated the remaining portions of the analysis on an aggregation of the earnings patterns to nine categories for each sex, which distinguish the average level of income and the trend. Spreadsheets that we are supplying to SSA contain sufficient data to aggregate the basic 27 categories in a variety of alternative ways. For example, it is a straightforward process to recreate the 11 patterns that were used in earlier letter reports.

2. Classification Into Nine Earnings Patterns of Level and Trend

The nine earning patterns for men and women are shown for the six birth cohorts in Figures 8-3a through 8-3f. Even with a reduction in the number of groups from 27 to nine, some of the cells are too small to yield stable results. The sample size is provided in Tables 8-4a through 8-4c. For some male cohorts, groups #2, #3, #6, and #9 are 1 percent of the population or less. For women the small groups are #7 and #9. Thus, for some purposes, the nine groups will require further aggregation.

Some important characteristics of the projections of the earnings projections are highlighted by focusing on the results for the 1931-35 and 1956-60 cohorts. First, as shown in Table 8-4b, there is a sharp decline in the proportion of men with patterns of rising earnings (categories #3, #6, and #9) between the earliest and latest cohort. Similarly, the number of men with low and level earnings (#2) is small in both cohorts.

Second, comparison of Figures 8-3a and 8-3f shows a substantial compression of the range of the change in earnings over the work life as the analysis moves from the 1931-35 cohort to the 1956-60 cohort. While the average age-earnings patterns for those with level earnings trends are similar between the two cohorts, within the three categories with declining earnings patterns, the magnitude of the drop in earnings over the work life is significantly less for the 1956-

60 cohort than for the 1931-35 cohort.[5] Similarly, the rise in average earnings is smaller for the three categories with a rising trend.

Likewise, the compression of the range of trend change in earnings and some skewing of the distribution of the patterns is evident in Tables 8-4a through 8-4c. As mentioned in the prior section, there is little net change in the distribution by level of average work life earnings for men and women combined. But there is a sharp rise in the proportion of women in the top third of the distribution, from 7.6 percent in the 1931-35 cohort to 22 percent for the 1956-60 cohort. The opposite is true for men where the proportion in the top third of the distribution falls from 60.2 to 44.3 percent.

The changes in the distribution of individuals among the categories of trend earnings, shown in the third panel of Tables 8-4a through 8-4c, are also substantial for both men and women. For both, there is a sharp falloff in the number with rising earnings pattens, albeit from much different proportions in the 1931-35 cohort. For the 1956-60 cohort, only 1.8 percent of men and 26.6 percent of women have rising relative earnings over their work life. These compare with 20.3 and 52.6 percent respectively in the 1931-35 birth cohort. For women, there is also a sharp decline in the number with declining relative earnings, a general pattern of compression of the distribution of trend changes. In the case of men, however, the sharp fall in the proportion with a rising trend pattern is matched by an equally large increase in the proportion with declining relative earnings over their work life.

To some extent, these changes in the distribution of workers among the earnings patterns reflect trends that we know have been important recently. Women's earnings are rising faster that those for men. However, the tendency toward a compression of the distribution arises from the use of a limited number of equations to project the central tendency of earnings in Chapter 2. The age distribution of relative earnings for men and women, implied by the regression coefficients in the earnings equation from Chapter 2, are shown in Figure 8-4. There are separate earnings patterns for five educational groups and they have been aggregated to the 10-year periods used to compute the earnings patterns. For men, the earnings patterns are downward sloping over the relevant ages, except for those with some graduate education where the pattern is flat. For women, the opposite is true, earnings rise with age except for the very lowest education group.

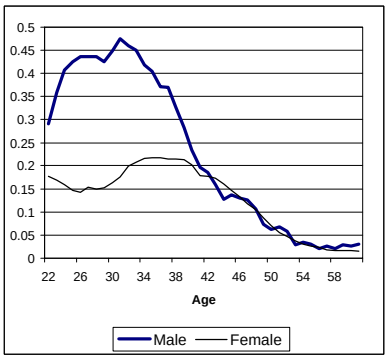
While an error term is included in the projections for each individual and year, there will still be a tendency for the earnings of any subgroup to revert towards the central tendency as expressed by the regression line. The only identified characteristic that distinguishes individuals with rising earnings patterns from those with falling earnings is their sex. Thus, the group means are unlikely to display the full range of variation in the trend element, even if the underlying distribution of individuals' earnings does so.

Figure 8-3a
Basic Earnings Patterns, Male and Female

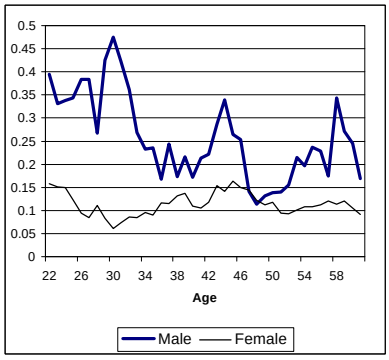
1931-35 Cohort

Low Income

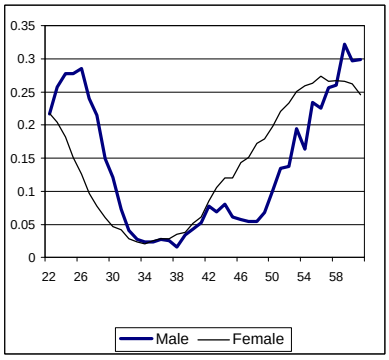
Declining Trend



Level Trend

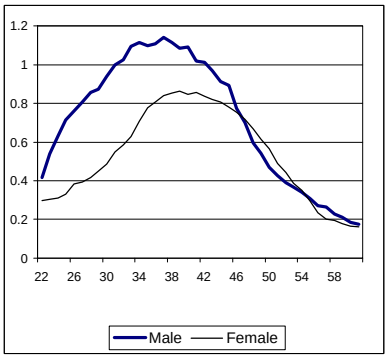


Rising Trend



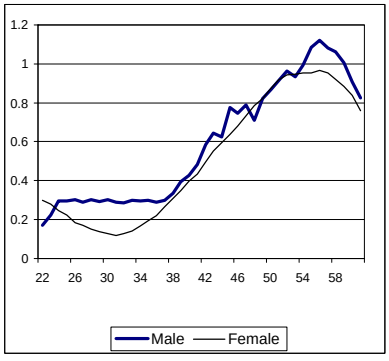
Middle Income

Declining Trend



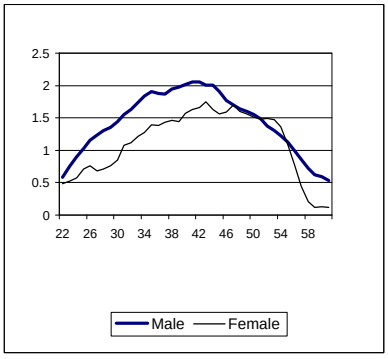
Level Trend

Rising Trend

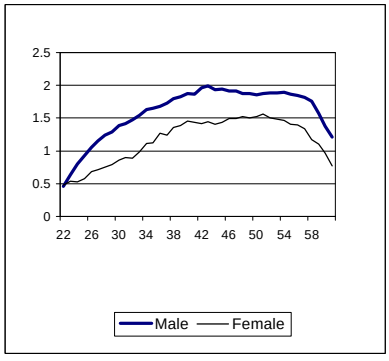


High Income

Declining Trend



Level Trend



Rising Trend

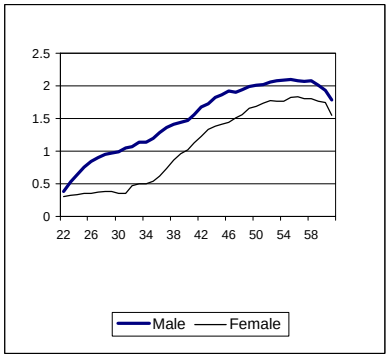
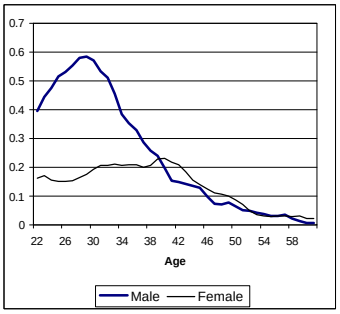


Figure 8-3b
Basic Earnings Patterns, Male and Female

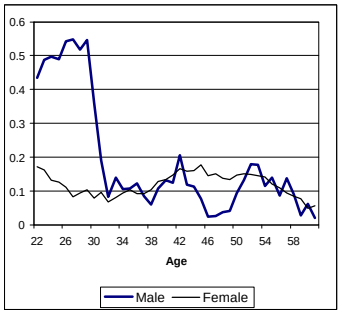
1936-40 Cohort

Low Income

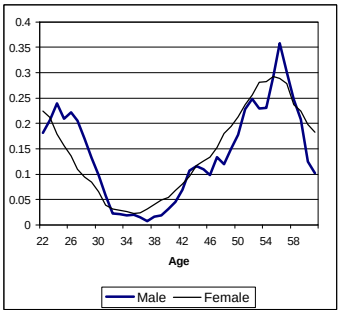
Declining Trend



Level Trend

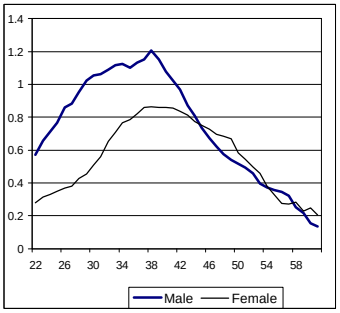


Rising Trend

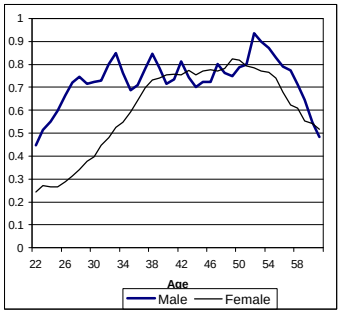


Middle Income

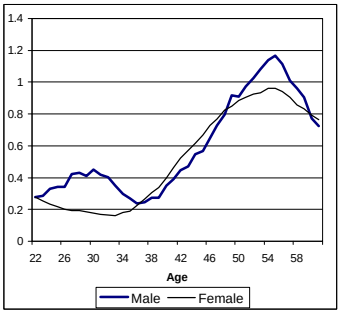
Declining Trend



Level Trend

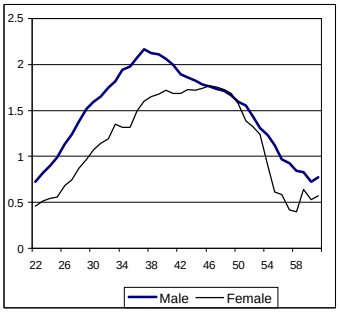


Rising Trend



High Income

Declining Trend



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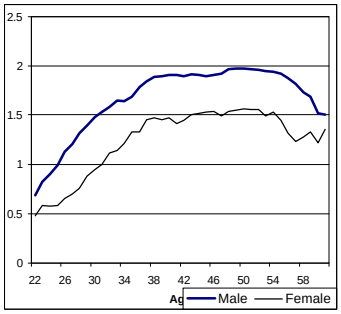


Rising Trend

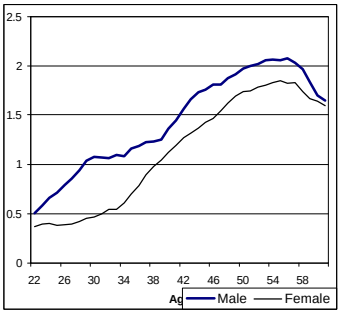
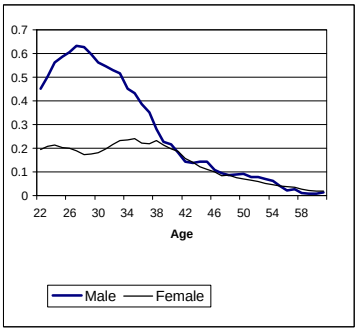


Figure 8-3c
Basic Earnings Patterns, Male and Female

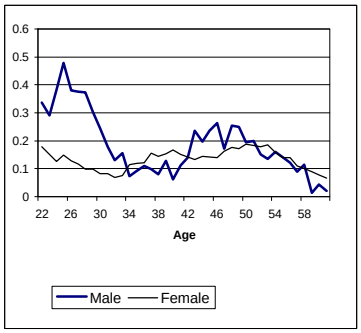
1941-45 Cohort

Low Income

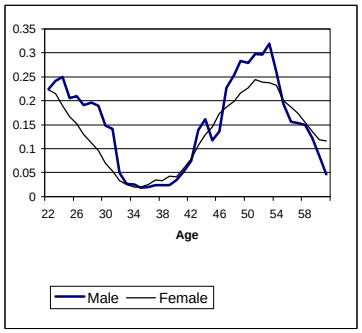
Declining Trend



Level Trend

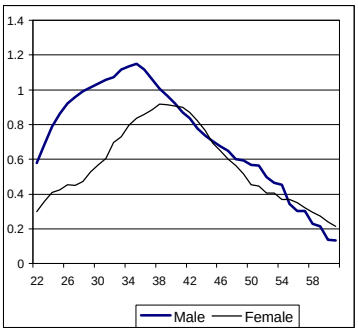


Rising Trend

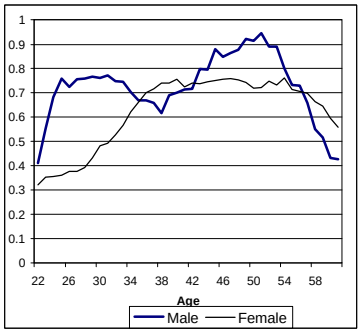


Middle Income

Declining Trend



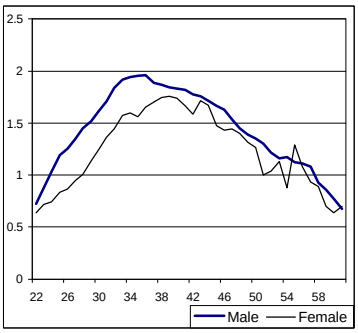
Level Trend



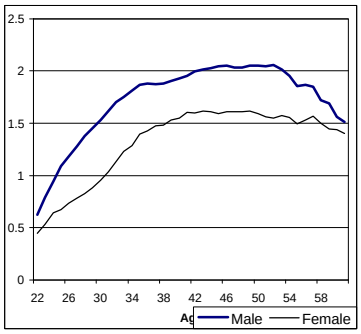
Rising Trend

High Income

Declining Trend



Level Trend



Rising Trend

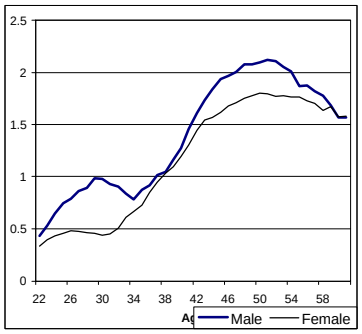
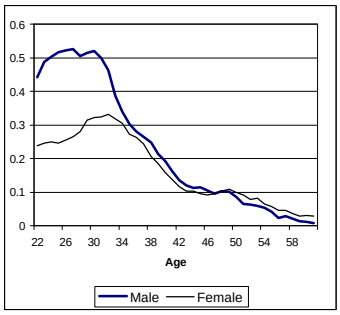


Figure 8-3d
Basic Earnings Patterns, Male and Female

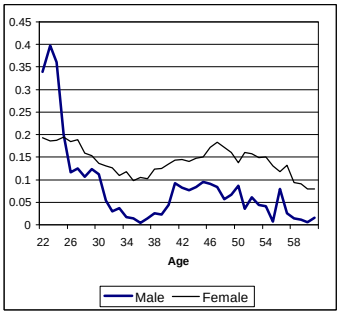
1946-50 Cohort

Low Income

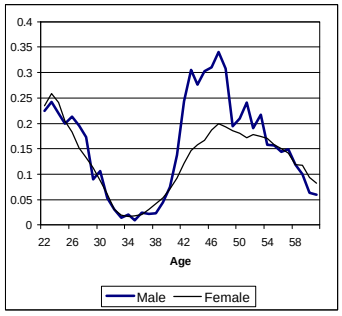
Declining Trend



Level Trend

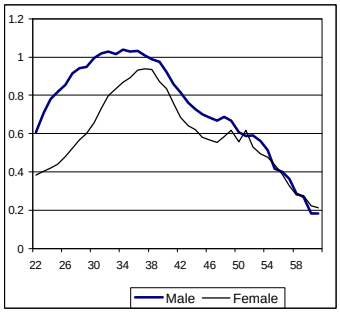


Rising Trend

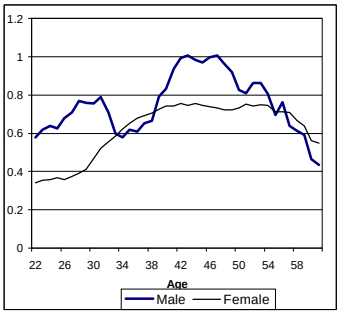


Middle Income

Declining Trend



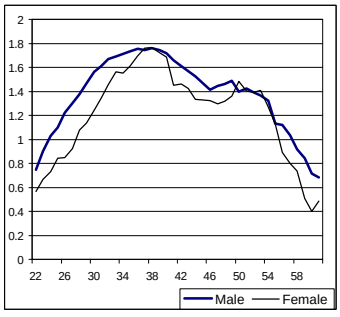
Level Trend



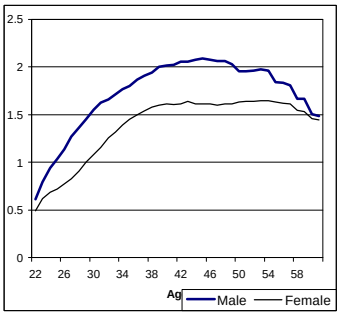
Rising Trend

High Income

Declining Trend



Level Trend



Rising Trend

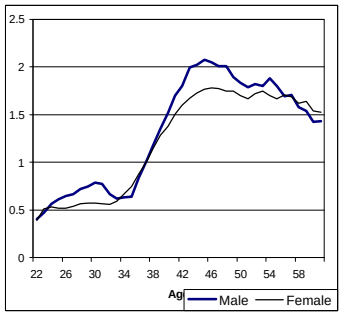
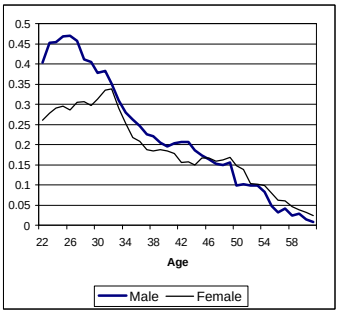


Figure 8-3e
Basic Earnings Patterns, Male and Female

1951-55 Cohort

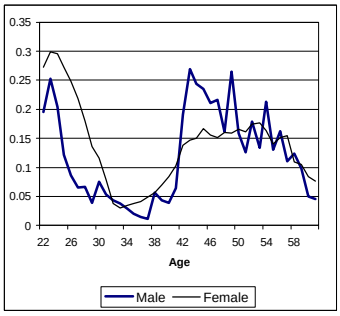
Low Income

Declining Trend



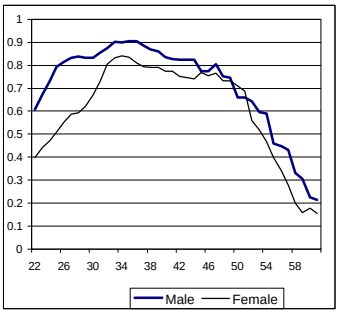
Level Trend

Rising Trend

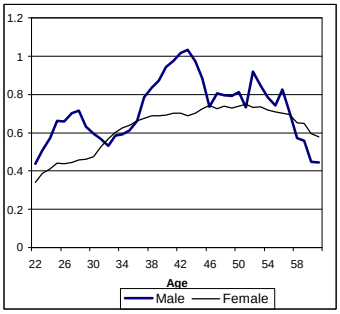


Middle Income

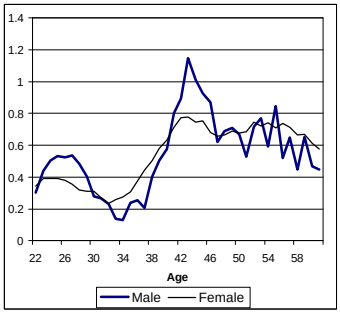
Declining Trend



Level Trend

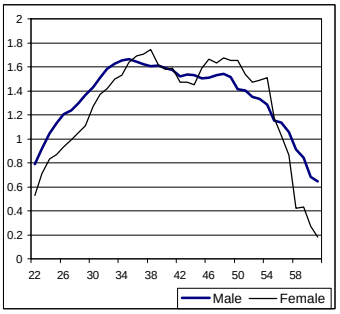


Rising Trend



High Income

Declining Trend



Level Trend

Rising Trend

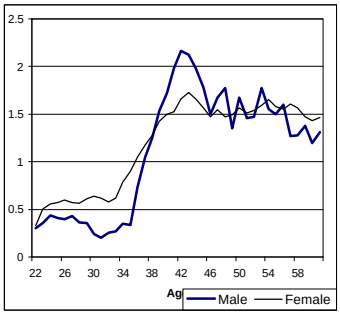
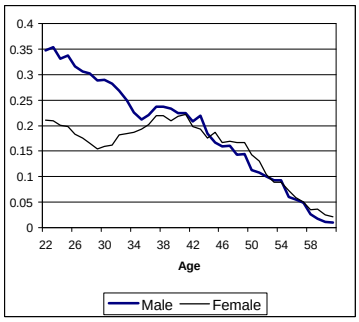


Figure 8-3f
Basic Earnings Patterns, Male and Female

1956-60 Cohort

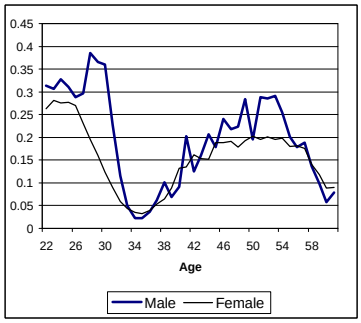
Low Income

Declining Trend



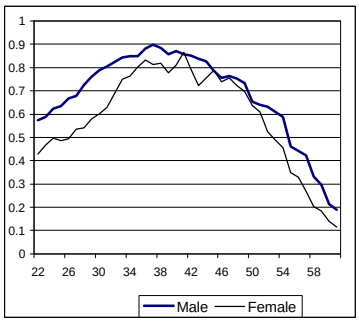
Level Trend

Rising Trend

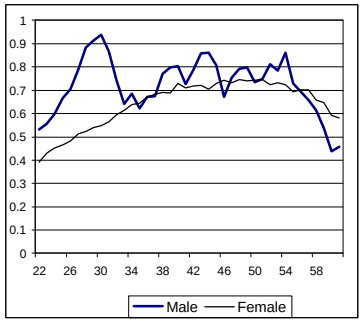


Middle Income

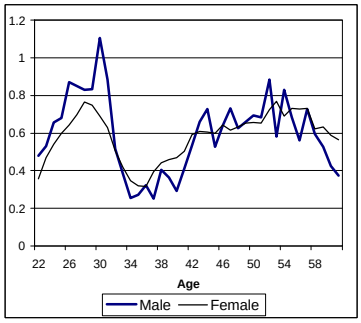
Declining Trend



Level Trend

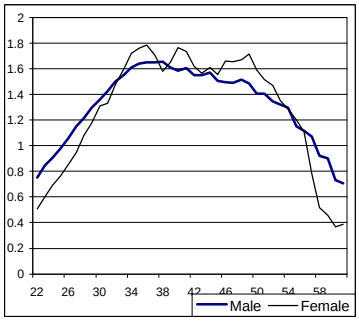


Rising Trend

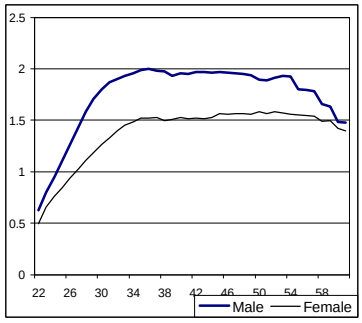


High Income

Declining Trend



Level Trend



Rising Trend

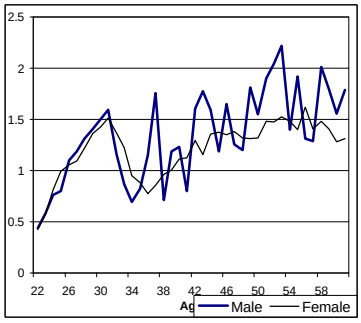
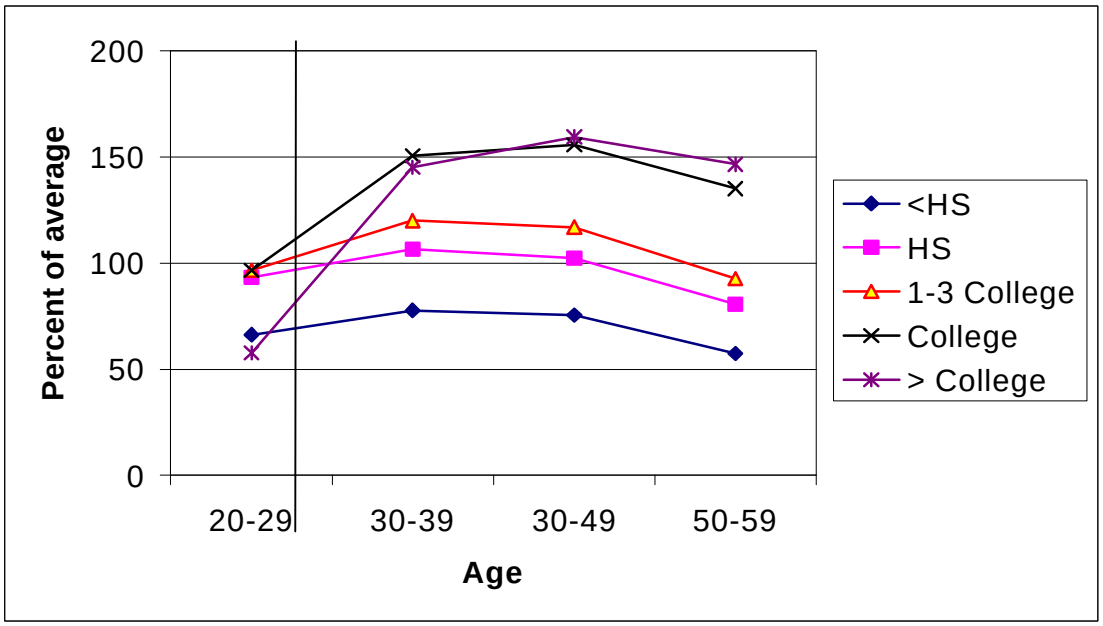
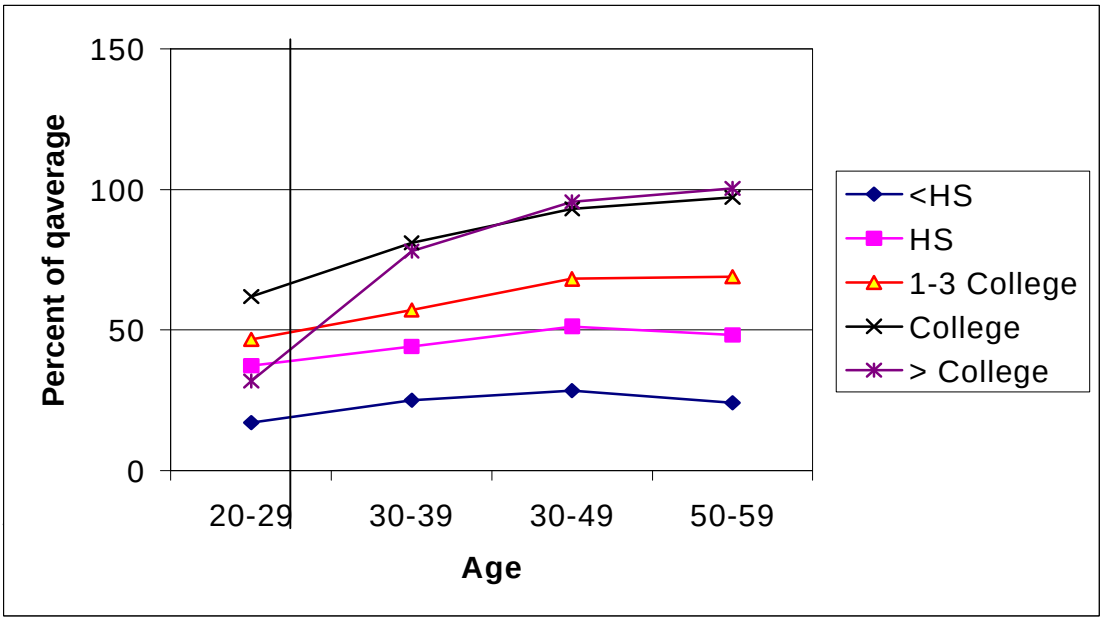


Figure 8-4
Estimated Age-Earnings Patterns by Sex and Educational Level

Men



Women



Source: Regression estimates of Task 5. Sum_9.xls

However, there also appears to be an element of bias in the projections because we would expect a substantial number of women to continue to have a rising age-earnings pattern. Instead the pace of decline in the number of both men and women in the rising trend categories of Tables 8-4b and 8-4c accelerates with the 1951-55 birth cohort. One possible reason for this is that the earnings regressions reported in Chapter 2 were originally developed with historical data that included the earnings of the disabled. The projections are based on those regressions. However, in a later stage of the projections the earnings of those who are predicted to become disabled are converted to zero with the onset of disability. This results in a downward bias in the mean rate of earnings growth for the population as a whole, because the disabled are included in the sample that predicts earnings of the non-disabled. As discussed in Chapter 2, however, the bias may be modest to the extent that the disabled workers whose earnings are zeroed out had below average projected earnings.

Finally, the methodology used to project earnings in Chapter 2 will project an appropriate number of workers with low earnings, but it does not predict zero earnings. This is not a problem for the earnings patterns themselves, but it may have some influence on the decomposition of the nine earnings patterns into an age-earnings pattern of those with positive earnings and the proportion of individuals with zero earnings at a given age. However, in constructing the average of nonzero earnings, we used a cutoff value of 0.01 of the average wage relative than absolute zero. Table 8-5 shows the average proportion of 'zero' earnings years in the 1956-60 cohort compared with the historical data of the 1931-35 cohort. There is a decline in the proportion of zero-earnings years, but it is concentrated among low-earning women and seems quite in keeping with their rising pattern of labor force participation.

3. Earnings Patterns of Married Couples

The nine earnings patterns for men and women have also been matched in a set of couples files. There are a total of 12 files, six cohorts for both men and women, with nine tables in each file corresponding to the nine earnings patterns. The structure of those files is shown in Table 8-6. The less-censored earnings of line 2 are the same as the age-earnings patterns reported in section B, and taxable earnings are reported on line 3. The two measures of earnings are the same after 1989 when the taxable earnings ceiling was indexed to the economy-wide average wage. The proportion of individuals with sufficient taxable earnings to qualify for the basic pension and the Primary Insurance Amount (PIA) are reported on lines 4 and 5. The PIA is the average of the individual PIAs, and it is computed on the basis of the relative earnings up to age 61; but it uses the level of earnings and the 'bend points" of 1996.

Lines 7-12 show the distribution of the respondents by marital status, and the PIA of the spouse. The distribution of the spouses' and their PIAs among the nine age-earnings patterns is reported on lines 14-23. Some spouses are not in the universe if their birth year was outside the range of 1926-65 or they had no taxable earnings. The percentage of individuals in the group surviving at each age from 63 to 110 is shown on line 26.

Table 8-5
Frequency of Zero Earnings Year, by Sex, Birth Cohort, and Earnings Pattern

Annual average of percentages, ages 31-61

Pattern	Total		Men		Women	
	1931-35	1956-60	1931-35	1956-60	1931-35	1956-60
Q1T1	64	47	61	53	65	39
Q1T2	61	20	37	52	64	17
QiT3	58	26	67	45	57	25
Q2T1	23	13	23	12	22	19
Q2T2	7	3	4	11	8	2
Q2T3	21	8	24	24	20	7
Q3T1	8	5	8	4	13	12
Q3T2	2	1	2	1	3	0
Q3T3	5	5	3	14	10	3
Total	28	14	25	24	29	14

based on a cuttoff of 0.01 of the economy-wide average wage

Table 8-6
Contents of the Couples Files, 1931-35 Cohort

	MEN GROUP Q1T1				AGE 22	23	24	25	26	..
LESS CENSORED AVERAGE INDEXED EARNINGS					0.29105648	0.357962	0.407357	0.425066	0.436204	..
AVERAGE INDEXED TAXABLE EARNINGS					0.2856392	0.340941	0.39583	0.40325	0.413025	..
Percent with PIA	71.7									
Average PIA	$501.02									

Marital Status at Age 62	Unweighted Number of Observations	Weighted Number of Observations	Percent of Spouses with PIA	Average PIA of the Spouse
TOTAL	275	458	60.9	$578.20
MARRIED	204	337	59.6	$584.84
WIDOWED	15	26	69.9	$601.35
DIVORCED	23	41	66.1	$512.90
OTHER	13	21	(NA)	(NA)
NEVER MARRIED	20	34	(NA)	(NA)

Spouse's Stylized Group	Unweighted Number of Observations	Weighted Number of Observations	Percent of Spouses with PIA	Average PIA of the Spouse
GROUP Q1T1	69	114	51.6	$362.67
GROUP Q1T2	14	23	45.2	$440.03
GROUP Q1T3	60	99	59.3	$353.45
GROUP Q2T1	19	33	100.0	$685.40
GROUP Q2T2	8	13	100.0	$723.25
GROUP Q2T3	28	47	100.0	$761.38
GROUP Q3T1	0	0	0.0	$0.00
GROUP Q3T2	5	10	100.0	$1,155.99
GROUP Q3T3	10	15	100.0	$1,092.71
Not in Universe	62	105		
		458		

	AGE 63	64	65	66	67	..
PERCENT SURVIVING TO SPECIFIED AGE	97.322	93.984	88.466	85.377	83.100	

The 31 to 35 year cohort
Weighted observations are shown in thousands.
Average PIA of the group is based on those with nonzero aime at age 62.
Average PIA of spouse is based on those with nonzero aime at age 62.
Aime converted to 1996 dollars before computation of PIA.
Universe - Persons of Specified Sex Reaching Age 62 in their life and with nonzero earnings during the ages 31 to 62.
Not in Universe - No spouse at age 62 or spouse without earnings during the Ages 32-61.
Persons with disability onset before age 62 are included.

Table 8-7 provides a summary of the extent of marital matching by income level for the 6 birth cohorts using both men and women as the reference persons. While there is some tendency for individuals to have spouses in the same income group, it is largely overwhelmed by the differences in income levels between the two sexes. That is, while the proportion of high-income men married to high-income women rises for later birth cohorts, that is largely due to the general tendency for women to move higher in the overall income distribution relative to men.[6] However, there is a very strong tendency for women, even those in the top income group, to marry men with a higher income.

Tables 8-8a and 8-8b report the PIA for married individuals, their spouse's PIA, and the combined total for each of the 9 earnings patterns for both sexes and the six birth cohorts. PIAs are reported only for those with a nonzero AIME at age 62. Because the PIAs are estimated on the basis of 1996 economic conditions, the average PIAs of each group are relatively constant across the six cohorts. However, the combined PIAs of couples distributed by the males' income (Table 8-8a) is rising for later cohorts because the spouse is moving into the higher income groups. No such pattern is evident for women (Table 8-8b), but the combined PIA is much higher for each group when women are used as the reference group because of their tendency to have spouses with a higher work-life income and PIA. Finally, the combined values only include individual and spouses who qualify for their own pension, i.e., have a PIA.

Tables 8-9a and 8-9b report the proportions of individuals in each group at age 62 who survive to various later ages, for each sex and the six birth cohorts. They show the expected pattern of a higher proportion of women than men surviving to a given age. There is also a positive correlation between survivorship and income level. However, the correlation with average work life income is less than one might expect because of a low correlation between the measure of permanent income constructed from SIPP data and our measure of work life income which is a 30-year average of earnings. In addition, some of the cells are too small to yield reliable results.

Table 8-7
Marital Matching of Income Levels, Cohorts 1931-60

Men

Percentages of Marital Matching of Income Levels, by Age Cohort							
Man's Income Level:	Wife's Income Level	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Low	68%	62%	60%	54%	53%	52%
Low	Middle	26%	30%	32%	30%	31%	33%
Low	High	7%	8%	8%	16%	15%	15%
Middle	Low	58%	54%	51%	47%	41%	41%
Middle	Middle	36%	37%	38%	38%	41%	44%
Middle	High	6%	10%	10%	16%	17%	16%
High	Low	57%	48%	47%	45%	42%	40%
High	Middle	33%	37%	34%	33%	34%	35%
High	High	10%	15%	19%	22%	24%	24%

Women

Percentages of Marital Matching of Income Levels, by Age Cohort							
Woman's Income Level:	Husband's Income Level	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Low	14%	15%	17%	20%	21%	20%
Low	Middle	28%	31%	31%	28%	33%	36%
Low	High	58%	54%	52%	52%	45%	43%
Middle	Low	11%	12%	13%	14%	15%	14%
Middle	Middle	24%	28%	31%	32%	38%	28%
Middle	High	65%	60%	56%	53%	47%	58%
High	Low	10%	10%	9%	11%	12%	17%
High	Middle	17%	23%	18%	22%	26%	16%
High	High	73%	67%	72%	67%	62%	67%

Source: spousesumm.xls

Table 8-8a
Average Primary Insurance Amount, Men, 1931-60

Average PIA - Men							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$501	$536	$564	$541	$513	$499
Low	Level	$498	$447	$487	$499	$456	$485
Low	Increasing	$407	$394	$417	$399	$359	$422
Middle	Declining	$829	$857	$864	$866	$847	$822
Middle	Level	$812	$812	$819	$849	$837	$842
Middle	Increasing	$729	$734	$749	$764	$712	$748
High	Declining	$1,115	$1,170	$1,184	$1,189	$1,184	$1,169
High	Level	$1,184	$1,235	$1,277	$1,294	$1,302	$1,311
High	Increasing	$1,193	$1,198	$1,199	$1,182	$1,111	$1,200

Average PIA - Wives							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$578	$599	$600	$655	$623	$623
Low	Level	$625	$548	$597	$732	$667	$689
Low	Increasing	$565	$589	$614	$662	$646	$760
Middle	Declining	$605	$634	$630	$675	$677	$679
Middle	Level	$586	$607	$643	$679	$734	$739
Middle	Increasing	$581	$625	$695	$628	$777	$632
High	Declining	$595	$667	$685	$708	$715	$718
High	Level	$645	$698	$728	$742	$743	$765
High	Increasing	$612	$692	$794	$727	$627	$774

Average PIA - Total							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$1,079	$1,135	$1,165	$1,196	$1,137	$1,123
Low	Level	$1,123	$994	$1,084	$1,232	$1,123	$1,174
Low	Increasing	$972	$983	$1,031	$1,061	$1,005	$1,182
Middle	Declining	$1,434	$1,492	$1,494	$1,541	$1,524	$1,500
Middle	Level	$1,397	$1,420	$1,462	$1,528	$1,571	$1,581
Middle	Increasing	$1,311	$1,359	$1,444	$1,392	$1,488	$1,380
High	Declining	$1,710	$1,837	$1,869	$1,897	$1,899	$1,887
High	Level	$1,829	$1,932	$2,005	$2,036	$2,045	$2,076
High	Increasing	$1,805	$1,890	$1,993	$1,908	$1,739	$1,974

Source: Piasum.xls

Table 8-8b
Average Primary Insurance Amount, Women, 1931-60

Average PIA - Women							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$410	$422	$419	$453	$468	$435
Low	Level	$407	$402	$385	$404	$414	$377
Low	Increasing	$398	$390	$391	$384	$350	$343
Middle	Declining	$696	$718	$745	$777	$811	$797
Middle	Level	$717	$742	$748	$747	$742	$751
Middle	Increasing	$696	$698	$708	$707	$701	$729
High	Declining	$1,060	$1,110	$1,153	$1,164	$1,200	$1,205
High	Level	$1,084	$1,119	$1,157	$1,182	$1,178	$1,179
High	Increasing	$1,074	$1,102	$1,122	$1,140	$1,125	$1,136

Average PIA - Husbands							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$965	$969	$1,001	$981	$955	$893
Low	Level	$945	$970	$1,007	$994	$956	$946
Low	Increasing	$999	$1,023	$1,038	$1,072	$1,059	$1,038
Middle	Declining	$995	$981	$1,014	$1,032	$1,008	$935
Middle	Level	$988	$964	$999	$1,026	$1,009	$958
Middle	Increasing	$1,014	$1,047	$1,072	$1,063	$1,064	$1,059
High	Declining	$1,044	$1,066	$1,168	$1,102	$1,117	$1,146
High	Level	$1,033	$1,050	$1,098	$1,087	$1,093	$1,064
High	Increasing	$1,070	$1,070	$1,143	$1,153	$1,073	$1,157

Average PIA - Total							
Income Third	Income Trend	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$1,375	$1,391	$1,420	$1,434	$1,423	$1,329
Low	Level	$1,352	$1,373	$1,392	$1,397	$1,370	$1,323
Low	Increasing	$1,397	$1,414	$1,429	$1,456	$1,409	$1,382
Middle	Declining	$1,691	$1,699	$1,759	$1,809	$1,819	$1,731
Middle	Level	$1,705	$1,706	$1,747	$1,773	$1,751	$1,709
Middle	Increasing	$1,711	$1,744	$1,780	$1,771	$1,765	$1,788
High	Declining	$2,105	$2,176	$2,320	$2,266	$2,317	$2,351
High	Level	$2,117	$2,169	$2,255	$2,269	$2,271	$2,242
High	Increasing	$2,144	$2,172	$2,265	$2,294	$2,198	$2,293

Source: Piasum.xls

Table 8-9a
Survival After Age 62, Men, 1931-60 Cohorts

Percent of Men Surviving to Age 65							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	88.466	94.162	93.329	93.445	92.968	91.518
	Level	67.532	100.000	85.516	93.416	93.945	97.547
	Increasing	89.889	94.798	90.796	95.151	91.253	96.096
Middle	Decreasing	89.395	94.187	94.674	93.039	95.210	95.012
	Level	91.814	86.576	93.503	92.274	96.943	96.530
	Increasing	97.245	95.981	93.956	91.518	100.000	96.058
High	Decreasing	91.962	93.565	95.163	95.312	95.933	94.846
	Level	92.494	94.210	94.155	95.350	95.435	95.932
	Increasing	93.457	94.844	92.858	98.585	92.744	100.000

Percent of Men Surviving to Age 70							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	72.264	80.412	81.742	80.549	77.707	78.663
	Level	62.173	100.000	71.033	80.864	78.265	83.966
	Increasing	68.745	81.674	81.870	80.825	91.253	80.400
Middle	Decreasing	75.322	81.598	84.277	81.434	84.525	83.783
	Level	75.861	76.418	82.658	76.975	88.209	86.802
	Increasing	83.478	82.151	83.708	81.597	92.594	80.631
High	Decreasing	78.779	82.262	84.487	86.318	84.892	85.392
	Level	79.981	83.893	84.042	86.462	85.302	87.444
	Increasing	81.192	85.109	82.291	90.579	86.552	92.999

Percent of Men Surviving to Age 75							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	58.180	65.832	63.203	63.985	66.271	62.530
	Level	51.111	90.938	44.959	63.952	66.413	74.165
	Increasing	58.177	67.955	70.469	68.590	73.523	69.688
Middle	Decreasing	61.314	65.623	68.436	68.125	69.874	70.781
	Level	65.531	63.338	66.589	62.110	67.779	72.132
	Increasing	62.204	65.449	72.891	63.555	78.691	65.524
High	Decreasing	65.945	70.298	70.513	74.527	72.157	72.063
	Level	67.879	72.166	70.494	73.575	73.723	73.423
	Increasing	68.663	75.019	68.607	79.609	75.270	92.999

Source: life3xp.xls

Table 8-9b
Survival After Age 62, Women, 1931-60 Cohorts

Percent of Women Surviving to Age 65							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	93.154	97.628	97.237	98.018	97.311	96.736
	Level	95.849	98.110	96.066	96.524	97.466	97.385
	Increasing	95.948	96.481	97.292	98.478	97.703	97.739
Middle	Decreasing	94.272	98.179	97.297	97.709	98.630	97.114
	Level	94.158	98.193	98.058	97.446	98.429	97.986
	Increasing	95.456	98.456	97.596	97.945	97.750	99.047
High	Decreasing	96.280	98.406	95.901	97.722	96.712	97.375
	Level	97.258	95.789	97.309	98.477	98.479	98.194
	Increasing	97.373	97.625	98.072	98.553	98.357	100.000

Percent of Women Surviving to Age 70							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	87.032	93.021	92.628	91.584	91.893	90.970
	Level	89.378	93.993	90.195	90.289	92.463	92.209
	Increasing	88.825	92.057	91.793	93.492	91.763	94.061
Middle	Decreasing	89.312	95.225	93.417	93.453	95.389	93.499
	Level	83.241	89.858	93.972	92.064	92.743	93.476
	Increasing	91.467	92.783	92.087	93.911	91.350	95.135
High	Decreasing	96.280	92.478	94.274	93.647	90.844	96.012
	Level	90.778	91.848	93.230	94.693	94.716	95.439
	Increasing	94.249	92.385	95.647	94.942	96.234	97.505

Percent of Women Surviving to Age 75							
		Age Cohort					
Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	78.358	85.176	84.636	84.877	83.241	83.271
	Level	85.074	90.363	80.900	82.551	84.927	85.887
	Increasing	80.873	85.820	86.117	87.111	85.266	88.092
Middle	Decreasing	82.474	86.945	85.848	87.284	89.092	86.665
	Level	78.587	83.846	85.304	85.405	85.730	88.191
	Increasing	83.633	86.467	84.359	87.629	84.455	91.188
High	Decreasing	86.940	85.025	88.225	90.058	81.305	93.849
	Level	80.760	89.157	84.813	91.121	89.585	90.371
	Increasing	89.102	86.160	90.546	88.328	93.636	97.505

Source: life3xp.xls

APPENDIX A
COMPARING MINT STYLIZED PROFILES WITH TRADITIONAL SOCIAL SECURITY WAGE PROFILES

I. INTRODUCTION

This Appendix presents computations comparing the present value of OASI lifetime benefits and the wealth that workers with stylized earnings patterns would accrue at retirement if they could invest employee and employer OASI contributions in defined contribution accounts with alternative assumed rates of return. It also computes the internal rate of return on OASI contributions. These calculations are performed for workers with the stylized earnings patterns reported in this chapter and the results are compared with the same calculations for workers with the traditional Social Security "Low," "Average," and "Maximum" wage profiles.

As a note to the reader, the terms "stylized earners," "profiles," and "wage earners" are used interchangeably in this appendix.

II. STYLIZED EARNINGS PATTERNS

Traditionally, Social Security has developed estimates of the returns to Social Security on the basis of three stylized earnings patterns. The maximum-income group represents those who had earnings at the maximum taxable amount in every year. The middle group is represented by someone who earns at the average taxable earnings amount in every year, and the low-income group represents those who earn at 45 percent of this average amount.

The MINT project has generated more representative stylized profiles across the population, facilitating comparison with the more traditional stylized Social Security earners on such issues as accumulated wealth and rates of return. Among the various stylized patterns, it is also possible to trace out how the pattern of earnings over time might affect the accumulation of pension wealth in a reformed system that might include individual accounts.

We use 9 stylized earnings patterns for both men and women born between 1931 and 1960 inclusive. The profiles categorize workers based on whether their lifetime earnings are low, middle, or high and whether their average earnings between ages 31-40 and 51-60 are decreasing, level, or increasing. Table 8-A-1 shows the distribution of earnings patterns for the

Table 8-A-1
Mint Wage Profile Descriptions and Sample Weights for 1935 Birth Cohort

Male Wage Profile	Description	Male Sample Size	Female Sample Size	Percent Distribution		(Two-Earner) Spouse's Profile
				Male	Female	
1	Low income, decreasing	458	1,218	10.3	25.9	1
2	Low income, level	25	235	0.6	5.0	3
3	Low income, increasing	183	1,221	4.1	26.0	3
4	Middle income, decreasing	753	382	16.9	8.1	1
5	Middle income, level	164	251	3.7	5.3	3
6	Middle income, increasing	187	1,039	4.2	22.1	6
7	High income, decreasing	1,092	55	24.5	1.2	3
8	High income, level	1,055	90	23.7	1.9	3
9	High income, increasing	536	213	12.0	4.5	3
Totals		*4,453*	*4,704*	*100.0*	*100.0*	—

The table shows that profiles 1, 4, 7, and 8 represent 75 percent of the 1931-35 sample of male earners. (For the 1951-55 sample, these same four profiles comprise 92 percent of male earners).

Computations of the MINT and SSA wage profile characteristics discussed in this appendix are driven by the following assumptions.

- We took 5-year averages of the data so that we are modeling 6 cohorts: 1931-35, 1936-40, 1941-45, 1946-50, 1951-55, and 1956-60.

- Earnings are measured as multiples of the Social Security average wage in each year and then aligned by the age of the individual. The Social Security "Low" and "Average" profiles are constant multiples of the average wage in every year of a worker's career, while the MINT profile multiples vary from year to year. The "Average" or middle Social Security profile is always 1, corresponding to the average wage in that year; the "Low" profile is always 0.45 times the average wage; the "Maximum" profile is the ratio of the taxable maximum to the average wage in a given year.

- The actual shape of the age-earnings patterns change from cohort to cohort along with the distribution of individuals among the nine patterns, although the criteria for classifying persons among the groups remains the same. The general trend is for relative earnings to increase over time, but there is wide diversity with considerable numbers of persons whose earnings decline with age in the lower income groups.

- Workers are assumed to pay both the employee's and employer's share of Social Security taxes; that is, employers will in practice transfer the burden of such taxes to workers in the form of reduced wages.

- All persons are assumed to retire at age 65. Hence, those retiring in 2003 and later see their monthly benefits actuarially reduced based on the schedule in current law.

- Couples are assumed to be the same age and have two children, born when parents are aged 25 and 30. *This factor is important because our model includes all possible, expected streams of OASI survivors', spousal, or workers' benefits that can be received in each year of a worker's career and retirement, in its estimates of lifetime social security benefits.*

- Our computations employ 1998 OASDI Trustees economic assumptions and 1998 birth cohort life tables from the Office of the Actuary at the Social Security Administration.

III. PRINCIPAL FINDINGS

Our principal findings, using the nine stylized earnings patterns described above, are the following:

- For low and middle earners, Social Security's traditional stylized patterns generally represent workers with higher career earnings than is representative in the population as a whole. Thus, Social Security's low earner is closer to someone with between low and average career earnings, its person with average earnings is closer to someone between average and high earnings.

- Mainly because of these differences, we find that profiles of low and average earners computed in MINT have lower Social Security retirement benefits, but receive higher internal rates of return from Social Security than the traditional stylized earner in Social Security.

- The traditional measure of earnings in Social Security assumes that a worker earns the same wage, relative to the average wage in the economy, every year. That is, they start, stop, and stay at their highest and lowest wage, relative to the economy. He or she is also

never out of the labor force for the year. Implicitly, then, Social Security's stylized earnings pattern takes the average wage for all earners in a given year rather than the average wage for all people who participate in Social Security, whether they work or not in a given year.

- As a consequence, given normal earnings patterns, the replacement rate defined as the percentage of peak year's earnings replaced by Social Security is much lower for the MINT representative worker than for the SSA stylized patterns with level earnings. The primary insurance amount as a percent of the economy-wide average wage is also lower for the MINT workers than the SSA workers. However, the primary insurance amount as a percent of the average earnings (indexed) is higher for the MINT workers, especially for low earners and one-earner couples, than for their SSA counterparts. The higher replacement rate for MINT workers compared with their SSA counterparts reflects the interaction of their lower earnings with the redistributive benefit formula in Social Security.

- How one fares with an individual account vis-a-vis the Social Security benefit formula depends upon the rate of return in the account and the variance in lifetime earnings patterns. At higher rates of return especially, those whose lifetime earnings come earlier in life fare relatively better under individual accounts than do those whose earnings come later in life. We see this effect in contrasting the social security stylized earners who receive their peak wage from their starting year and hence make larger contributions earlier on that accumulate more interest over time than the MINT earners, who experience more typical hump shaped earnings patterns and, in particular, have much lower earnings in the earliest years of their careers.

IV. DETAILED DISCUSSION OF RESULTS

In the tables below, we first display a comparison of earnings and social security benefits for representative MINT and SSA earners. We then compare lifetime net benefits under Social Security and a system of individual accounts for different family types and earnings profiles. The last group of tables shows internal rates of return and replacement rates under the current Social Security benefit formula for different types of workers, again using both the MINT and SSA profiles.

Table 8-A-2 shows annualized average indexed monthly earnings (AIME) for the SSA and MINT profiles in year 2000 dollars. SSA profiles enjoy significantly higher *average* earnings than their MINT counterparts. In most cases, SSA profiles receive higher wages than MINT profiles in *every year of work.*

Table 8-A-2
Average Indexed Monthly Earnings for SSA and MINT Wage Profiles for Birth Cohorts 1931-35 and 1951-55

Birth Year	Profile	SSA	MINT				SSA-to-MINT	
		Worker	Male Worker	Percent of Males	Female Worker	Percent of Females	Male Worker	Female Worker
1931-35	Low	1,031	528	15.0	348	56.9	1.95	2.96
	Middle	2,290	1,717	24.8	1,386	35.5	1.33	1.65
	High (Max.)	4,559	3,403	60.2	2,861	7.6	1.34	1.59
	Weighted Average	—	*2,555*	*100.0*	*909*	*100.0*	—	—
1951-55	Low	1,236	619	19.0	477	41.2	2.00	2.59
	Middle	2,747	2,076	31.8	1,754	36.8	1.32	1.57
	High (Max.)	6,688	4,514	49.2	4,030	22.0	1.48	1.66
	Weighted Average	—	*2,997*	*100.0*	*1,729*	*100.0*	—	—

Note: Amounts are in constant 2000 dollars. The MINT profiles "Low," "Middle," and "High" are weighted averages of the 3 Low, 3 Middle, and 3 High profiles. The weighted average of all 9 profiles for a given cohort is listed last.

AIMEs for SSA profiles range from 1.33 to 2.96 times as large as the AIMEs for comparable SSA profiles. As shown in the last two columns of the table, the AIME for SSA traditional earners exceeds the AIME for MINT earners in all income categories for both men and women in both the 1931-35 and 1951-55 birth cohorts. The largest difference in AIME between SSA and MINT workers is for low-earnings workers, especially for low-earning females. The gap between SSA and female MINT workers decreases to some degree between the 1931-35 and 1951-55 cohorts, but remains large.

The weighted average AIME of MINT men and women differs from the AIME of MINT middle earning men and women. The weighted average AIME of all MINT men is 12 percent *above* the middle SSA AIME, while the weighted average of AIME of all MINT women is 60 percent below the middle SSA AIME. The difference between the AIME of weighted average and middle-earning MINT men and women reflects the skewness of the earnings distribution. Sixty percent of men in the MINT sample fall into the three higher income profiles, while 57

percent of the women fall in the three lower income profiles. Within the MINT profiles, the AIME spread between high and low is roughly 6.4 to 1 for men and 8.2 to 1. For a weighted average of all workers in the MINT sample, the AIME for males is 2.8 times the AIME for females.

The primary difference between the 1931-35 and 1951-55 birth cohorts in terms of AIMEs is that women gain ground in terms of income, both relative to men and the SSA prototypical earners over the intervening years. (In fact, there are relatively fewer men in the higher income profiles in 1951-55 than in 1931-35.) While women earners are still concentrated in the lower and middle income groups, the percentage of women in the lowest income group decreases 16 percentage points between 1931-35 and 1951-55, while the percentage of women in the highest income profiles nearly triples from around 8 percent to 22 percent. The gap between both male and female MINT earners and the middle SSA worker narrows between the two birth cohorts. The weighted average of MINT women earners in 1951-55 is 37 percent lower than the SSA average worker, which is for women born in 1931-35. The weighted average MINT male earner's AIME is 9 percent above the AIME of the SSA middle earner, less than the 12 percent difference for the 1931-35 cohort.. Within the MINT profiles, the AIME spread between high and low earners in 1951-55 is roughly 7.3 to 1 for men and 8.4 to 1 for women, showing a slight increase in earnings inequality for men but no change in inequality for women. The ratio of MINT male to female weighted average AIME is 1.7, again showing that women have significantly gained ground relative to men.

Table 8-A-3 displays present value of lifetime benefits for the low, middle, and maximum (or high) earners from the SSA and MINT profiles in the 1931-35 and 1951-55 birth cohorts. The SSA stylized earners do not receive much more in social security benefits than their MINT counterparts, despite their significantly higher lifetime earnings, as shown in Table 8A.2. There are two reasons that the difference between SSA and MINT benefits is proportionately less than the difference between SSA and MINT earnings. First, MINT stylized earners benefit more from Social Security's redistributive benefit formula because of their lower earnings. Second, so the MINT profiles receive proportionately more in spousal and survivors' benefits than do the SSA profiles because the difference in wage levels between MINT spouses is higher than the difference in wages between SSA spouses.

Table 8-A-3
Lifetime Social Security Benefits for SSA and MINT Wage Profiles for 1931-35 and 1951-55 Birth Cohorts

Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort				1951-55 Birth Cohort			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple
1	Low, decreasing	56,237	45,701	128,349	140,846	68,734	77,455	147,298	190,983
2	Low, level	57,797	37,736	129,749	149,932	29,692	71,132	66,364	107,819
3	Low, increasing	40,491	54,061	88,589	109,594	40,174	57,659	85,596	116,438
4	Middle, decreasing	101,097	110,624	228,365	233,220	123,677	142,327	262,060	272,089
5	Middle, level	99,717	115,676	222,230	226,808	122,402	141,924	257,564	268,032
6	Middle, increasing	91,337	114,929	199,491	265,861	106,113	133,486	222,807	301,714
7	High, decreasing	148,894	182,032	331,414	336,518	187,345	234,732	395,259	410,920
8	High, level	158,127	185,703	350,589	355,572	207,985	242,611	437,123	453,422
9	High, increasing	161,555	189,757	356,107	360,860	180,080	232,710	371,223	382,784
10	SSA Low, level	73,233	96,338	164,232	188,106	90,466	114,354	191,043	223,054
11	SSA Average, level	120,938	159,093	270,621	296,251	149,323	188,719	315,338	350,963
12	SSA Max., level	175,575	230,968	387,471	450,694	239,205	302,313	504,336	571,024
Weighted Average (MINT)		*125,788*	*82,571*	*279,920*	*288,959*	*149,240*	*131,458*	*315,066*	*334,732*

Note: MINT profiles are numbers 1-9. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female. Social security benefits are adjusted for the chance of death in all years after age 21.

Table 8-A-4 shows the ratio of individual account wealth to lifetime social security benefits at a 2 percent rate of return for four family types, grouped by nine different wage profiles. A value less than 1.00 means that social security provides higher benefits than an individual account does for the given household in the given wage profile.

The weighted averages in the bottom row summarize the story. For both birth cohorts, Social Security provides an equal or higher level of benefits than an individual account returning 2 percent real for all earnings profiles of single females, one-earner couples, and two-earner couples. Individual accounts provide higher benefits for high-wage single males. The ratio of individual account wealth to social security benefits for women and couples increases over time

because of growth in real earnings and women's rising participation rates in the labor force. Hence, the 1951-55 birth cohort features higher weighted averages for all stylized earners. As with the 1931-35 cohort, however, only higher income single males (the majority of males) receive higher benefits from individual accounts than they would from Social Security.

The SSA profiles fare relatively better under individual accounts than Social Security than their MINT counterparts. Maximum-wage SSA earners receive a higher present values of benefits under an individual account system than under Social Security in both birth cohorts. In the 1951-55 birth cohort, average-wage, single men and women and two-earner couples also receive more in lifetime benefits from individual accounts than from Social Security.

Table 8-A-5 shows the same calculations as Table 8-A-4, but with a 5 percent real interest rate. In both cohorts, the higher interest rate makes individual accounts preferable to Social Security for most MINT single wage earners. For some single wage earners, individual accounts provide net benefits that are worth two or three times the net present value of Social Security benefits with individual accounts. Most groups of both men and women receive more wealth with individual accounts than with Social Security, but individual accounts help men relatively more than women. All SSA stylized earners receive higher benefits under an individual account system at 5 percent interest, with the exception of low-income, one-earner couples. The ratios of individual account wealth to Social Security wealth for all SSA wage earners exceed the corresponding ratios for their MINT counterparts.

Even at a 5 percent rate of return, some MINT profiles still fare better under Social Security than with individual accounts. In the 1931-35 birth cohort, most groups of lower income profiles (profiles 1-3) and the middle income group (profiles 4-6) of one-earner couples receive a higher present value of benefits under Social Security than with individual accounts. For the 1951-55 birth cohort, however, generally only lower income one-earner couples would benefit more from Social Security than individual accounts. Finally, the ratios of individual account wealth to lifetime Social Security benefits are higher in 1951-55 than in 1931-35 for all the SSA earners and most of the MINT profiles.

Table 8-A-6 shows the internal rates of return (IRR) that different worker types receive from Social Security. Within a cohort, couples receive higher returns than singles in the same earnings profile category because of Social Security's spousal and survivor's benefits. Single women receive higher rates of return than single men because they live longer and can expect to receive more years of benefits. (In addition, in the MINT profiles, women receive higher replacement rates than men because they have lower AIMEs.) One-earner couples receive the highest IRRs overall because of Social Security's generous spousal benefits. Among cohorts, earlier cohorts enjoy higher IRRs than later cohorts. Comparing SSA profiles and MINT profiles, the latter do better under Social Security for two primary reasons. First, MINT workers have lower wage levels than the corresponding SSA profiles and thus benefit more from Social

Table 8-A-4
Ratios of Individual Account Wealth to Social Security Wealth at a Two Percent Real Interest Rate

MINT Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort				1951-55 Birth Cohort			
		Single Male Worker	Single Female Worker	One-Earner Couple	Two-Earner Couple	Single Male Worker	Single Female Worker	One-Earner Couple	Two-Earner Couple
1	Low, decreasing	0.54	0.39	0.24	0.34	0.66	0.50	0.31	0.44
2	Low, level	0.58	0.42	0.26	0.36	0.61	0.50	0.27	0.42
3	Low, increasing	0.45	0.37	0.21	0.35	0.56	0.47	0.26	0.43
4	Middle, decreasing	0.97	0.70	0.43	0.50	1.12	0.86	0.53	0.65
5	Middle, level	1.01	0.73	0.46	0.53	1.12	0.88	0.53	0.62
6	Middle, increasing	0.91	0.68	0.42	0.61	0.97	0.80	0.46	0.69
7	High, decreasing	1.18	0.87	0.53	0.58	1.39	1.06	0.66	0.70
8	High, level	1.32	0.92	0.60	0.64	1.59	1.14	0.76	0.79
9	High, increasing	1.33	0.87	0.60	0.65	1.15	1.01	0.56	0.61
10	SSA Low, level	0.88	0.69	0.39	0.69	1.00	0.81	0.47	0.82
11	SSA Average, level	1.18	0.93	0.53	0.70	1.34	1.09	0.64	0.84
12	SSA Max., level	1.49	1.18	0.67	0.91	1.97	1.61	0.93	1.19
Weighted Average (MINT)		*1.08*	*0.53*	*0.48*	*0.55*	*1.22*	*0.76*	*0.58*	*0.66*

Note: MINT profiles are numbers 1-9. Contributions to worker individual accounts are made at the OASI tax rate in effect for the given year and compound at a 2 percent real annual interest rate with all amounts reinvested. Individual account wealth is thus total accumulated wealth at age 65, adjusted for the chance of death in all years after age 21. This amount is then divided by the present value at age 65 of lifetime social security benefits a worker would have received given his/her wage history and average life expectancy for his/her birth cohort and gender, also adjusted for the chance of death in each year after age 21. (Note that workers always retire at age 65 and those retiring after 2003 have their benefits actuarially reduced in line with increases in the NRA stipulated in current law). Ratios less than one indicate that the present value of lifetime social security benefits at age 65 exceed individual account wealth at age 65. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Table 8-A-5
Ratios of Individual Account Wealth to Social Security Wealth at a Five Percent Real Interest Rate

MINT Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort				1951-55 Birth Cohort			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple
1	Low, decreasing	1.33	0.89	0.58	0.82	1.71	1.21	0.80	1.11
2	Low, level	1.27	0.84	0.57	0.72	1.62	1.09	0.72	1.03
3	Low, increasing	0.87	0.64	0.40	0.64	1.18	1.09	0.55	0.95
4	Middle, decreasing	2.14	1.44	0.95	1.10	2.55	1.89	1.21	1.51
5	Middle, level	1.98	1.37	0.89	1.02	2.37	1.76	1.12	1.31
6	Middle, increasing	1.57	1.11	0.72	1.02	1.94	1.55	0.93	1.37
7	High, decreasing	2.37	1.73	1.07	1.15	3.00	2.26	1.42	1.52
8	High, level	2.49	1.72	1.12	1.20	3.25	2.23	1.54	1.63
9	High, increasing	2.40	1.45	1.09	1.17	2.10	1.89	1.02	1.15
10	SSA Low, level	1.73	1.35	0.77	1.37	2.11	1.71	1.00	1.73
11	SSA Average, level	2.33	1.82	1.04	1.39	2.84	2.30	1.35	1.77
12	SSA Max., level	2.67	2.09	1.21	1.68	4.09	3.31	1.94	2.47
Weighted Average (MINT)		*2.14*	*0.99*	*0.96*	*1.09*	*2.66*	*1.58*	*1.26*	*1.46*

Note: MINT profiles are numbers 1-9. Contributions to worker individual accounts are made at the OASI tax rate in effect for the given year and compound at a 2 percent real annual interest rate with all amounts reinvested. Individual Account wealth is thus total accumulated wealth at age 65, adjusted for the chance of death in all years after age 21. This amount is then divided by the present value at age 65 of lifetime social security benefits a worker would have received given his/her wage history and average life expectancy for his/her birth cohort and gender, also adjusted for the chance of death in each year after age 21. (Note that workers always retire at age 65 and those retiring after 2003 have their benefits actuarially reduced in line with increases in the NRA stipulated in current law). Ratios less than one indicate that the present value of lifetime social security benefits at age 65 exceed individual account wealth at age 65. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Table 8-A-6
Real Lifetime Internal Rates of Return for MINT and SSA Wage Profiles

Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort				1951-55 Birth Cohort			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple
1	Low, decreasing	3.62	4.56	6.25	5.15	3.02	3.78	5.12	4.22
2	Low, level	3.61	4.68	6.34	5.55	3.21	3.95	5.63	4.54
3	Low, increasing	4.68	5.62	7.45	5.99	3.77	4.03	6.40	4.67
4	Middle, decreasing	2.08	3.08	4.62	4.16	1.67	2.42	3.83	3.22
5	Middle, level	1.95	3.03	4.74	4.25	1.64	2.40	3.95	3.51
6	Middle, increasing	2.36	3.52	5.48	4.01	2.11	2.72	4.54	3.22
7	High, decreasing	1.46	2.45	4.12	3.85	1.02	1.83	3.26	3.09
8	High, level	1.03	2.28	3.85	3.60	0.51	1.59	2.88	2.75
9	High, increasing	0.96	2.54	3.89	3.63	1.49	1.96	4.05	3.69
10	SSA Low, level	2.44	3.20	5.30	3.30	2.01	2.61	4.34	2.64
11	SSA Average, level	1.45	2.25	4.22	3.22	1.08	1.73	3.41	2.56
12	SSA Max., level	0.49	1.41	3.49	2.36	(0.17)	0.54	2.21	1.46
Weighted Average (MINT)		*1.82*	*4.25*	*4.56*	*4.07*	*1.47*	*2.92*	*3.72*	*3.27*

Note: MINT profiles are numbers 1-9. While we assume that both SSA Men and Women earn the same exact wages, women's longer life spans give them different IRRs. All social security contribution and benefit amounts are adjusted for the chance of death in all years after age 21. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Security's redistributive benefit formula. Second, the difference in wage levels between MINT spouses is larger than for the SSA spouses we chose to model, which increases the value of survivors' and spousal benefits for MINT retirees compared with SSA profiles.

The main pattern that emerges from the IRR comparison in Table 8A.6 is that the Social Security system provides the highest rates of return to low-income earners, women, and one-earner couples. Because an individual account system, without explicit redistribution, would provide the same IRR for everyone, these same groups would benefit the least from replacing Social Security with individual accounts.

The preceding tables have evaluated Social Security as an investment program to provide retirement income and compared the present value of wealth and rates of return for different representative wage earners and family types. Another concern of retirement policy is whether Social Security provides enough to enable people to maintain their living standards after retirement. The replacement rate, or fraction of a workers' earnings that social security replaces, is one important measure of whether social security provides adequate income for retirees, especially for low career earnings who may lack other sources of retirement income, such as private pensions or returns from non-pension saving.

Table 8-A-7 displays the fraction of annual earnings social security will replace for each worker type. There are various ways to measure this "replacement" rate. Because the MINT profiles experience rapidly declining earnings during the latter years of their careers, the first method compares the annual social security benefit received at age 65 with the worker's highest year of earnings. The second method compares benefits in the first year of retirement to a worker's career average earnings (the average of the best 35 years of worker earnings).

Under both sets of calculations, replacement rates from Social Security decrease as average incomes rise. One-earner couples can expect the highest replacement rates (we include the spousal benefit in the primary insurance amount), while single males can expect the lowest. SSA profiles enjoy higher replacement rates under the PIA-to-Peak Wage method because their peak wage equals their average wage (the determinant of AIME and therefore PIA) while, for MINT profiles, the peak wage may be 1.5 to 2.5 times the profile's average wage. The PIA-to-AIME method thus produces higher replacement rates overall (and higher rates for corresponding MINT categories than for SSA) because it measures the ratio of benefits to average instead of peak wages. Using the latter method, MINT workers receive higher replacement rates than their SSA counterparts because they have lower average lifetime earnings.

Table 8-A-7
Two Ways to Measure Replacement Rates for MINT and SSA Profiles from the 1935 Birth Cohort
(Figures in Percent)

Wage Profile	Description (wage level, shape)	Ratio of PIA to Peak Wage				Ratio of PIA to AIME			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two Earner Couple
1	Low, decreasing	37.7	50.9	56.5	41.9	78.5	86.6	117.8	81.4
2	Low, level	38.7	55.6	58.1	42.0	75.4	86.6	113.1	79.7
3	Low, increasing	40.0	47.8	60.0	43.6	86.6	86.6	129.9	86.6
4	Middle, decreasing	28.2	31.1	42.3	35.5	46.5	51.9	69.8	52.8
5	Middle, level	36.3	34.9	54.5	41.5	46.8	50.4	70.3	54.1
6	Middle, increasing	25.9	28.8	38.9	27.2	49.2	50.6	73.8	49.9
7	High, decreasing	23.0	25.2	34.5	30.5	39.6	40.9	59.4	44.9
8	High, level	25.2	28.8	37.8	33.2	35.9	40.6	53.9	40.9
9	High, increasing	24.6	25.0	36.8	32.6	34.8	40.3	52.2	39.6
10	SSA Low, level	51.8	51.8	77.7	51.8	57.8	57.8	86.6	57.8
11	SSA Average, level	38.5	38.5	57.7	42.6	42.9	42.9	64.4	47.5
12	SSA Max., level	21.9	21.9	32.9	26.6	31.3	31.3	46.9	35.2
Weighted Average (MINT)		*27.5*	*41.1*	*41.3*	*34.3*	*46.1*	*70.4*	*69.2*	*50.8*

Note: MINT profiles are numbers 1-9. SSA's profiles do not differentiate between men and women; both earn the exact same wages and therefore receive the exact same benefit in the first year of retirement (although differences in age-adjusted life expectancy will produce different *expected* annual and total lifetime benefits for the two sexes under these SSA profiles). MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

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CHAPTER 8: ENDNOTES

1. The current wage ceiling is indexed to the economy-wide wage with a two-year lag. At various points in the analysis the revised earnings is referred to as "less-censored earnings."

2. The methodology is adapted from work by Herman Grundman and Barry Bye of the Social Security Administration as reported in *Report of the Consultant Panel on Social Security to the Congressional Research Service*, Committee on Finance of the U.S. Senate and the Committee on Ways and Means of the U.S. House of Representatives, August 1976.

3. The choice of the three class intervals is not sensitive to the choice of birth cohorts. If the intervals were based on average earnings of the 1931-40 cohort whose work life was largely completed by 1996, the middle interval would extend from 0.33 to 1.02. For the 1941-60 cohort, it is 0.38 to 1.05.

4. Thus, the vector of average earnings is equal to the vector of non-zero earnings multiplied by the proportion of individuals with non-zero earnings.

5. Note that the scales of Figure 8-3f are smaller than the scales of Figure 8-3a, so that the drop in earnings in the former is much less than in the latter even though the two appear similar.

6. To explore the extent of matching in more detail, it would be useful to compute separate distributions by sex and birth cohort.